Assessment of Nutrition Knowledge and Dietary Practices of Adolescent Learners Aged 13-18 Years Old in Polokwane Municipality, Limpopo Province, South Africa

By

Maponya Thabo Daniel (58017828)

(BSc Nutrition, University of Venda)

Dissertation submitted in fulfilment of the requirements for

Masters (Consumer Science) degree

In the

Department of Life and Consumer Sciences College

of Agriculture and Environmental Sciences

University of South Africa

Supervisor: Dr Malongane F (PhD)

Department of Life and Consumer Sciences

University of South Africa

Co-Supervisor: Dr Mushaphi LF (PhD)

Department of Nutrition University of

Venda

2020

TABLE OF CONTENTS

CONTENTS **PAGE**

APPENDICES

LIST OF TABLES

LIST OF FIGURES

DEFINITION OF TERMS

Adolescence: Defined as an era of life from 11 year-olds towards 21 year-olds (Webb & Beckford, 2014). In this study, adolescence refers to the children from the ages of 13 to 18 years.

Dietary practice: Groups or individuals concerning which food choices they should eat (Preedy & Watson, 2010). In this study, dietary practices refer to the usual intake of food groups such as vegetables and fruits, meat and eggs, milk and milk products, starchy foods, legumes, fats and oils, sugary foods.

Obesity: Excessive body fat content; commonly measured by BMI. The international reference for classifying an individual as obese is a BMI greater than 30 (WHO, 2017).

Overweight: Defined as abnormal or excessive fat accumulation that may impair health. Overweight is a BMI greater or equal to 25 (WHO, 2017).

Under nutrition: Is defined as an insufficient intake of energy and nutrients to meet individual needs to maintain good health (Maleta, 2006).

Malnutrition: Is any physical ailment resulting either from an inadequate diet, such as a diet that either provides too much or too little of necessary nutrients or from a physical inability to absorb or metabolize nutrients (WHO, 2017).

Nutrition education: Any set of nutrition educational approaches that are supplemented by environmental supports required to enable good food choices and nutrition behaviours that help with good well-being and health (Kattelmann, 2014).

The nutrition transition: defined as a change in dietary consumption and energy outflow that corresponds with the demographic, economic and epidemiological change (Popkin, Adair & Ng, 2012).

Nutrition knowledge: Refers to the knowledge of concepts and processes related to nutrition and health including knowledge of diet and health, diet and disease, foods representing major sources of nutrients, and dietary guidelines and recommendations (Narayan, 2013). In this study, nutrition knowledge refers to whether adolescent has nutritional knowledge of SAFBDG and general guidelines on healthy eating.

Whole grain: Grains from cereals which after the milling contain constituents such as endosperm, bran, germ, macronutrients, micronutrients and trace elements of the original unprocessed whole kernel (Vorster, Badham & Venter, 2013).

Body image: Awareness of the overall physical form (Yadav, 2017).

KEYWORDS: Nutrition knowledge, Dietary Practice, South African food-based dietary guideline, Adolescent learners.

LIST OF ABBREVIATIONS/ACRONYMS

CVD: Cardiovascular Diseases

FBDG: Food-Based Dietary Guidelines

SAFBDG: South African Food-Based Dietary Guidelines

SANHANES: South African National Health and Nutrition Examination Survey

SES: Socio-Economic Status

SPSS: Statistical Package for Social Sciences

USA: United States of America

WHO: World Health Organization

CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

Adolescents period is characterized by poor dietary practices such as eating meals which contain low fruits and vegetables content, low meal frequency, high consumption of sweetened beverages, increased consumption of energy-dense foods, increased consumption of foods away from home with peers and skipping meals, particularly breakfast, consumption of high-dense fatty, sugary fast foods as the main meals of the day (Li *et al.*,2010). Health complications such as eating disorders, obesity, undernutrition, dental caries and iron deficiency are caused by unhealthy eating practices of adolescents (Elhassan, Gamal & Mohammed, 2013). Overweight in adolescence that continues to adulthood is associated with more significant dangers of developing heart diseases (Singh, Kochhar & Singh, 2008).

Nutrient intakes in South Africa have changed during the past 50 years, which resulted in a high intake of refined carbohydrates, saturated fat, added sugars and low intake of complex carbohydrates (Oldewage-Theron, Egal & Moroka, 2015). Additional changes that had been seen among the South Africans included a higher intake of total and animal protein foods and a lower intake of fiber (Oldewage- Theron, Egal & Moroka, 2015). These dietary changes are a result of the western diet and therefore, can lead to under and over nutrition (Vorster & Bourne, 2008).

The dietary practice of adolescent is influenced by factors such as the period spent outside of the house, attitudes, socio-demographic characteristics, behavioural, physical appearance (Lošić & Kenjerić, 2015) In addition, the factors mentioned above are persuaded by personal preferences, parents education, economic status and culture (Lošić & Kenjerić, 2015). The most dietary practices are fast food intake, consumption of food away from the house, intake of low vegetable and fruit, low intake of milk and dairy products, breakfast skipping, dieting to reduce weight and snacking (Nevenka , Irena & Marja, 2006).

Unhealthy dietary practices of the adolescent in the United States of America had included a diet that was low in vegetables, fruits, dairy products intake but rich in fatty

food (Sebastian *et al.*, 2009). In South Africa, Soweto, female adolescents had unhealthy dietary practices such as the eating of fat cakes, bunny chows, meal skipping, as well as low intake of vegetables and fruit (Sedibe *et al.*, 2014). Affordability and accessibility were the main reasons for the high consumption of these foods, while vegetables and fruit were either not accessible or expensive (Sedibe *et al.*, 2014). These dietary practices are influenced by nutrition transition, as most people procure their food (Kearney, 2010). Most of the adolescent who fail to produce their own food usually opt to purchase cheaper food which has a high-calorie content (Popkin, Adair & Ng, 2012).

In developing countries, a constructive association between nutrition transition and poor dietary practices occurred (Vorster & Bourne, 2008). During nutrition transition, developing countries have moved away from traditional diets that were high in fibre and cereal to a western diet that is high in fat, sugars, and animal food source (Popkin, Adair & Ng, 2012). Nutrition transition has been experienced in South Africa since 1994 (Ronquest *et al.*, 2015). The nutrition transition is defined as a change in dietary consumption and energy outflow that corresponds with the demographic, economic and epidemiological change (Popkin, Adair & Ng, 2012). Nutrition transition in South Africa is characterised by both under and over nutrition that occurs at a similar time (Oldewage-Theron, Egal & Moroka, 2015). Additional variations included an increased intake of animal protein foods and decreased fibre intake (Oldewage-Theron, Egal & Moroka, 2015). These changes in nutrient intake have shown to cause chronic diseases of lifestyle which are currently rated in the top ten list of causes of diseases (Vorster & Bourne, 2008; Statistics South Africa, 2016b).

The suitable choice of food in adolescence is partly influenced by the accurate knowledge of good nutrition (Kinyua, 2013). Nutrition knowledge is crucial for adolescents to make good food choices that will help them to have good health and also improve their lifestyle (Kinyua, 2013). Studies indicate a low level of nutrition knowledge among adolescents despite its benefit to proper nutrition. Webb and Beckford (2014) reported lower nutrition knowledge among adolescents in Trinidad and Tobago. On the other hand, Sichert-Hellert, Beghin, De-Henauw, Grammatikaki , Hallström , Manios, Mesana , Molnár , Dietrich , Piccinelli , Plada , Sjöström , Moreno & Kersting (2011) indicated that adolescents in European countries had a reasonable knowledge of

nutrition. Higher nutrition knowledge amongst adolescents in the South of Italy in the rural area of Sicily was found to be correlated with rich intake of fruits, vegetables, and considerably low intake sugary drinks, sweets, snacks and fried foods (Grosso *et al.*, 2013).

South African studies indicate that adolescents have inadequate nutrition knowledge which could possible results in poor dietary practices. In South Africa, Gauteng Province, Letlape (2010) reported insufficient nutrition knowledge amongst learners at Tswaing Secondary school. Another study conducted in the Eastern Cape Province found that 62.5% of the adolescent learners had an average nutrition knowledge score, while 58.3% had a low score (Oldewage-Theron, Egal & Moroka,2015).

Poor dietary patterns and inadequate knowledge of nutrition are linked to obesity and overweight (Bano *et al.*,2013). Obesity is reported as the number one leading cause of high blood pressure, cardiovascular disease, diabetes mellitus and high blood cholesterol in the world (Kelishadi & Azizi-Soleiman, 2014). The prevalence of overweight and obesity has strangely risen in the developed countries whereby 23.8% of boys and 22.6% of girls were overweight or obese in 2013 as compared with 16.9% of boys and 16.2% of girls in 1980 (Ng *et al.*, 2014). In developing countries, non-communicable diseases such as diabetes mellitus, coronary heart disease, stroke and asthma are related to high morbidity and mortality (Lock *et al.*, 2010). The prevalence of overweight and obesity has also risen in children and adolescents in developing countries whereby it increased from 8.1% in 1980 to 12.9% in 2013 for boys and 8.4% to 13.4% in girls in the similar year (Ng *et al.*, 2014). According to the South African National Health and Nutrition Examination Survey (SANHANES), the prevalence of overweight and obesity was considerably high in females (24.8% and 39.2%) than males (20.1% and 10.6% for males) respectively (Shisana, Labadarios, Rehle, Simbayi, Zuma, Dhansay, Parker, Hoosain, Naidoo, Hongoro, Mchiza, Steyn, Dwane, Makoae, Ramlagan, Zungu, Evans, & Jacobs 2013).

Poor dietary practices of adolescents may extend to adulthood and become the potential cause of chronic diseases of lifestyle (Bano *et al.*, 2013). In addition, there is a direct link between cardiovascular diseases, diabetes and poor dietary practices (Elhassan *et al.,* 2013). Adolescents around the world are becoming more independent. Their

subsequent dietary intake behaviour is likely to influence their long-term behaviour (Reddy *et al.*, 2008).

1.2. Problem Statement

Many youths engage in unhealthy eating practices that include high intakes of fast foods and other foods high in fat and sugar, as well as low intakes of fruits, vegetables, and calcium-rich foods (Sichert-hellert *et al.,* 2011). Unhealthy eating practices of adolescents may lead to health problems such as iron deficiency, eating disorders, obesity, undernutrition and dental caries (Musaiger *et al.,* 2011). Overweight in adolescents which persist to adulthood is associated with a high risk of heart diseases, and low intake of calcium is associated with osteoporosis in old age (Bano *et al.*, 2013).

Adolescents in South Africa consume high fat and high sugar foods almost every day (Letlape, 2010). According to Felley *et al*. (2012), adolescents in South Africa are exposed to high fast foods because these foods are available from formal (commercial franchises) and informal (such as street vendors) outlets. Since adolescents attain their food from other places such community shops and school, they are more likely to develop poor eating habits (Felley *et al.*, 2012).

Good nutritional status helps us to maintain all essential body functions so that we can grow and develop properly (Kinyua, 2013). Inversely, the poor nutritional status will compromise the growth and development of adolescents. Poor dietary practices are often related to poor nutrition knowledge (Barooah, 2012; and Kostanjevec, Jerman & Koch, 2013). In South Africa in the Eastern Cape Province, adolescents had poor nutrition knowledge and inadequate dietary intakes (Oldewage-Theron, Egal & Moroka, 2015). Poor dietary practices and lower nutrition knowledge cause poor nutritional status. However, a study of this nature has not been conducted among adolescents in Limpopo Province, South Africa. Hence, there is a necessity to do an assessment of nutrition knowledge and dietary practice among adolescents in Limpopo Province, South Africa.

1.3. Aim of the Study

The main aim of the study is to assess the nutrition knowledge and dietary practice of adolescent learners aged 13-18 years in the Polokwane Municipality, Limpopo Province.

1.4. Objectives of the Study

In order to meet the aim of the study, the following objectives were set

1.4.1. To assess nutrition knowledge of adolescent learners;
1.4.2. To investigate the dietary practices of adolescent learners;
1.4.3. To determine the relationship between nutrition knowledge and dietary practices.

1.5. Significance of the Study

The importance of this study was to document the information about nutrition knowledge and dietary practices of adolescent learners since few studies have been done in South Africa. The research findings may help the Department of Health and the Department of Education to develop nutrition intervention strategies that will improve services rendered to adolescent learners. The research may also add to the body of knowledge on nutrition knowledge and dietary practices of adolescent learners and may support in identifying gaps for further research. The correct diagnosis will help the department to design targeted nutrition education, thus making effective use of available resources.

1.6. Hypothesis

School teaches nutrition in life orientation and natural science subjects. Therefore, the researcher assumed that adolescent learners in Secondary Schools in the Province of Limpopo have sufficient knowledge on nutrition and also have good dietary practices as they are taught nutrition in school subjects such as life orientation and natural science. The researcher adopted the alternative hypothesis.

1.7. Structure of the Dissertation

Chapter one introduces the background information, problem statement, the aim of the study, objectives of the study, significance of the study and the hypothesis.

Chapter two discusses the reviewed literature related to the study.

Chapter three explains the research methods that were followed to execute the study. The methods include study design, study population, sampling, instrument development, data collection procedure, ethical considerations, and data analysis.

Chapter four shows the interpretation of the results of the study. The results are presented under demographic information, nutrition knowledge and dietary practices of the adolescent learners.

Chapter five presents the discussion of the study results relative to those of the reviewed studies.

Chapter six outlines the conclusion and recommendations emanating from the study. A list of all cited references that have been used and appendices are attached at the end of the dissertation.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

Adolescence may be defined as an era of life from 11 years old towards 21 (Webb & Beckford, 2014). During this era of life, a diet of good quality is needed to lower mortality and morbidity in adulthood (Grosso *et al.*, 2013). This era is characterized by different changes such as physiological, cognitive and physical development (Grosso *et al.*, 2013). A child is prepared into an adult due to several physiological changes that take place during adolescence (Webb & Beckford, 2014). Adolescence era is characterized by rapid growth spurt (Butterfield, 2015). According to Elhassan *et al.* (2013), nutritional needs during this era are greater than any other period in the lifecycle. Therefore, sufficient consumption of nutrients and energy should be monitored to ensure normal health and physical development.

According to the 2nd South African national youth risk behaviour survey, adolescents in South Africa are exposed continuously to unhealthy eating habits (Reddy *et al.*, 2008). These behaviours are usually adopted during their youthful years and often continue into adulthood (Reddy *et al.*, 2008). About 39.5% of learners consumed fast foods, with 26.5% having a supersized portion at each serving. The reported percentage of learners who had biscuits and sweet cooldrinks were 42.6% and 50.3%, respectively (Reddy *et al.,* 2008). These habits often put them at risk of chronic disease of lifestyle later in life. Dietary consumption behaviours developed during adolescence are more likely to influence adolescence behaviours in their later stages of development (Reddy *et al.*, 2008). Establishing a decent dietary habit during their youthful period will likely decrease adult morbidity and mortality from chronic lifestyle diseases (Grosso *et al.*, 2013).

Many programmes have been developed to combat an unhealthy lifestyle and obesity (Fahlman *et al.*, 2008). Programs that are designed for South Africa include distribution of food parcels, integrated food security nutrition program, school feeding program, micronutrient malnutrition control and the development of South African Food-Based Dietary Guidelines (Moeng & De Hoop, 2008:287; and Vorster, Badham & Venter, 2013). However, the incidence of malnutrition, Cardiovascular Diseases (CVD) and

obesity are still high in South Africa even after the implementation of the nutrition programs and the development of SAFBDG (Oldewage-Theron, Egal & Moroka, 2015). This demonstrates that people are not aware of such guidelines or do not have the means or the willingness to follow such guidelines.

This literature study reports on nutrition knowledge of adolescent learners, dietary practices of adolescent learners, the relationship between nutrition knowledge and dietary practices of adolescent learners, factors that may influence dietary practices of adolescent learners and, finally, community nutrition programs and strategies needed to improve knowledge on nutrition and good dietary practices.

2.2. Nutrition Knowledge of Adolescents Learners

Good nutrition helps to eliminate many health problems that are caused by malnutrition (Roth, 2011:13). Poor nutrition can results in poor health and causes diseases. To be healthy, one should consume foods that comprise of the six important nutrients, namely: carbohydrates, fats, proteins, minerals, vitamins, and water. The South African Food Based Dietary Guideline (SAFBDG) provides the general public with specific guidelines on healthy eating ((Vorster, Badham & Venter, 2013).

Nutrition knowledge is essential for adolescents to adopt a healthy lifestyle and good health (Narayan, 2013). In a study conducted among 1,050 Korean adolescents aged 14-19 years, it was shown that 43.1% of adolescents had little or did not have any knowledge of the nutritional value of junk foods. Fair knowledge of nutrition was also reported by Sichert-Hellert *et al.* (2011) in European countries amongst adolescents. Studies above indicate that nutrition knowledge is reported to be low even in developed countries.

In India, Sireesha and Bindu (2017) indicated that the majority of teenage girls had adequate nutrition. Nabhani-Zeidan, Naja and Nasreddine (2011) in Lebanon showed that adolescents belonging from both higher and lower low Socio-Economic Status (SES) had more knowledge of food sources of nutrients and dietary guidelines. Although total nutritional knowledge was high in both low and high SES, it was found to be the highest in high SES emphasizing the role of affordability.

In a study done by, Letlape (2010) in South Africa, Gauteng Province, inadequate nutrition knowledge was reported amongst adolescent learners at Tswaing Secondary School. Similarly, Oldewage-Theron, Egal and Moroka (2015) reported poor understanding of nutrition amongst adolescent learners from five different high schools in the rural Eastern Cape Province. In a study done by Shisana *et al.* (2013) in South Africa, 15.8% had low nutrition knowledge, 64.2 % had medium knowledge and 20.1 % had high knowledge. It is clear from the above studies that South African adolescents have poor nutrition knowledge. Most of the studies presented above indicated low to medium knowledge. There is a need for concerted efforts to improve nutritional knowledge.

2.3. Dietary Practices of Adolescent Learners

Dietary practices are the number of choices that groups or individuals should make concerning which foods need to be eaten (Preedy & Watson, 2010). Consumption of foods comprising of proteins, complex carbohydrates, essential fats, vitamins, and minerals are crucial for good dietary practice (Preedy & Watson, 2010). Following good dietary practices may help to prevent many problems that might occur during the period of adolescence and the later years. The dietary practices are presented in the form of food groups such as vegetables and fruits, meat and eggs, milk and milk products, starchy foods, legumes, fats and oils, sugary foods (Preedy & Watson, 2010).

2.3.1 Vegetables and Fruits

According to SAFBDG, plenty of vegetables and fruits should be eaten daily (Vorster, Badham & Venter, 2013). Vegetables and fruits are needed to reduce risk factors that may cause nutrition-related diseases and the burden of diseases (Naude, 2013). Consumption of 400g of fruits and vegetables is required, and it can be converted to five servings of 80g each (Amine *et al.,* 2003). This can be converted into three vegetables and two fruits or three fruits and two vegetables per day. In a study done by Musaiger *et al.* (2011), about 25% of the adolescent in Bahrain were consuming fruits and vegetables on a daily basis. Krebis *et al.* (2011) reported that adolescents in the United States of America were consuming an average of 3.5 servings per day of fruit and vegetables. In a study done by Skårdal *et al.* (2014) in Norway, adolescent boys had an average consumption of 2.9 servings of vegetables and fruits in a day while

girls had an average consumption of 3.5 servings of vegetables and fruits in a day. Naeeni, Jafari and Omidi (2019) indicated that children and adolescents in Iran were consuming an average of 2.3 of fruits for females and 2.0 for males. Females had consumed 1.1 servings on average in a day of vegetables, while males had consumed 0.7 servings on average in a day (Naeeni, Jafari & Omidi, 2019). The findings indicate that boys are less likely to make healthier food choices than girls.

According to SANHANES, 20.7% of adolescents had consumed the required number of vegetables and fruits (Shisana *et al.,* 2013). Vegetables and fruits are rich in minerals, phytochemicals and vitamins which are needed to prevent diseases and for proper growth and development (Naude, 2013). Lower intake of vegetables and fruits can lead to cancer and vascular disease (Duthie *et al.*, 2018). The possible reason for the lower consumption of vegetables and fruit in the developed countries could be due to poor diets, while lower intake of vegetables and fruits in the developing countries could be due to not having enough food to eat and poverty (Food & Agriculture Organization of the United Nations, 2015).

2.3.2 Milk, Maas and Yoghurt

According to SAFBDG, milk, mass, or yoghurt ought to be eaten every day (Vorster, Badham & Venter, 2013). Milk, maas and yoghurt contain too much calcium (Nicklas, 2003). Calcium is required for growing bones, reduction of risk of bone fracture, attainment of peak bone mass and in the prevention of osteoporosis in a later adult phase. The need for calcium increases during adolescence period, about 45 – 50% of the adult bone mass development happens during adolescence (Mesías, Seiquer & Navarro, 2011), thus the need for adequate calcium.

Alam *et al.* (2010) indicated that half of the adolescent girls who stayed in the rural area of Bangladesh did not consume milk daily. Similarly, Nabhani-Zeidan, Naja, and Nasreddine (2011) indicated that adolescents from low SES in Lebanon had low milk intake, while the ones in high SES had high intake. Napier and Oldewage- Theron (2015) indicated that adolescent girls in Durban did not meet the minimum requirements of one to two cups of milk or 200-400 millilitres a day. The reason for the low

consumption of milk could be linked to affordability. Milk is expensive, which explains low intake amongst adolescents in rural areas.

2.3.3 Fats and Oils

Dietary fat is needed in the body for healthy growth and development (Story & Stang, 2005). Fats can be divided into saturated, polyunsaturated, monounsaturated and trans fatty acids (Driver, 2000). Dietary cholesterol is the main steroid from the animal tissues (Soliman, 2018). It is recommended that total dietary cholesterol be less than 300g a day because of its link to cardiovascular diseases (Hu, 2010).

Saturated fats are the types of fats that are mostly found in animal foods and on few plant foods such as coconut, coconut oil, palm oil, and palm kernel oil (De Souza *et al.*, 2015). It is recommended that adolescents should consume less than 10% of fat from saturated fatty acids (Hu & Malik, 2010). In a study done by Skårdal *et al.* (2014) in Norway, girls were consuming fast foods at least 1.5 times per week while boys were consuming fast food 2 times per week. Rani and Sathiyasekaran (2013) indicated that 35% of adolescents in India were consuming potato chips daily. This high intake of chips and fast foods may lead to a high intake of saturated fats which might lead to diseases such as coronary heart disease, diabetes, hypertension, and cancer in the later stage.

Trans-fatty acids are defined as unsaturated fatty acids that either come from natural or industrial sources (World Health Organization, 2018). The trans-fatty acids are divided into two types, such as the ones that are produced in the industries and the ones that occur naturally in food products ruminants (WHO, 2018). Industrially produced trans-fatty acids are developed as a result of the partial hydrogenation of vegetable oils, whereas ruminant trans-fatty acids are created by the bacterial metabolism of poly unsaturated fatty acids in ruminants (De-Souza *et al.*, 2015).Industrially produced trans-fatty acids undergo a process of hydrogenation, whereby liquid vegetables are heated in a presence of hydrogen gas and catalyst (De-Souza *et al.*, 2015). In addition, industrially produced trans-fatty acids are mostly found in food sources such as brands of margarine, spreads, bakery products, fast food, soup, and sauce powders. The higher consumption of trans fatty acids can cause heart diseases, stroke, diabetes and inflammation (De- Souza *et al.*, 2015).

According to Smuts and Wolmarans (2013), unsaturated fats are types of fats that contain a high proportion of fatty acids molecules with at least one double bond, this type of fatty acids are considered to be healthier. In addition, unsaturated fats are needed to ease inflammation, improve blood cholesterol levels, and stabilize heart rhythms. Monounsaturated fats and polyunsaturated fats are two types of good unsaturated fats. Food sources such as olive, peanut, canola oils, avocados, nuts and seeds are some of the examples of monounsaturated fats. Food high in polyunsaturated fats acids are corn, sunflower, soybean, flaxseed oils, walnuts, flash seeds, fish (Smuts & Wolmarans, 2013).

2.3.4 Chicken, Fish, Lean Meat and Eggs

SAFBDG recommends that chicken, lean meat and eggs should be eaten every day (Vorster, Badham & Venter, 2013). Red meat, milk, eggs, and fish are good sources of quality protein. Proteins rich foods are needed to support growth and development and also repair worn-out tissues (Petrie, Stover & Horswill, 2004).

In a study done by Alam *et al.* (2010) amongst adolescent girls in rural Bangladesh, the average days of consumption for fish were 3.4 in a week. Musaiger *et al.* (2011) reported that only 6.9% of adolescents in Bahrain consumed fish every day. The intake of fish in Norway for both girls and boys was an average of 1.50 servings a week (Skårdal *et al.*, 2014).

Chicken is the most consumed meat product in South Africa (Vorster, Badham & Venter, 2013). Chicken is a high source of protein and is high in water-soluble B Vitamins and minerals. In a study done by Nabhani-Zeidan (2011) in Lebanon, both adolescents in low and high SES had consumed a lower amount of the recommended intake of meat. On the contrary, in a study done by Reddy *et al.* (2008) in South Africa, 52.2% of adolescent learners had often eaten meat four or more times a week. Alam *et al. (*2010) indicated that 1.3% of teenage girls in rural Bangladesh had consumed meat six to seven times a week. Chicken is less expensive in South Africa, which explains the high intake. Although beef and chicken contains a high-quality protein, higher consumption of beef is often linked to higher consumption of saturated fats, and

may not be suitable for human health.

Eggs are rich sources of protein and other essential nutrients, such as Vitamin A, Vitamin B12, Vitamin B6 and Vitamin D (Vorster *et al.,* 2013). In a study done by Alam *et al.* (2010) in rural Bangladesh, 6.2% of the adolescent girls had consumed eggs six to seven times a week. On the other hand, Elhassan *et al.* (2013) reported a higher percentage (17.7%) of Afhad University in Sudan who had eaten eggs daily. In South Africa, Ronquest *et al.* (2015) reported that the consumption of eggs had increased from 5.8% in 1999 to 24.1% in 2012. The low intake of eggs is a concern considering the benefit of eggs in proving energy.

2.3.5 Legumes

SAFDG recommends that soya, dry beans, split peas, and lentils should be consumed regularly (Vorster, Badham & Venter, 2013). Meats and foods that are high in saturated fat should be replaced with peas, lentils and dry beans which are needed to prevent obesity, CVD, type 2 diabetes and cancer (Hutchins, Winham & Thompson, 2012).

Musaiger *et al.* (2011), reported that 62.4% of adolescents in Bahrain rarely consumed lentils or beans in the previous week. Results from the study done by Varela-Moreiras, Ávila , Cuadrado , Del- Pozo, Ruiz & Moreiras Varela-Moreiras (2010) in Spain, revealed that each person had consumed an average of 11,9 grams daily of legumes and pulses. In a study done by Labadarios, Steyn and Nel (2011) in South Africa, 18% of adults had consumed nuts and legumes. The highest consumption was reported in KwaZulu-Natal (25%) and Eastern Cape (24%). The province with the lower consumption was Limpopo Province with only 8% of adults reported to have consumed legumes. Those who consumed legumes, 23% were in the tribal area, and 16% were in the urban area. The lower intake of legumes is a concern considering the benefit of legumes in reducing CVD, type 2 diabetes, cancer, and obesity.

2.3.6 Starchy Foods

SAFDG recommend that foods that are rich with starch should form the base of most meals (Vorster, Badham & Venter, 2013). Carbohydrates can be divided into two forms,

such as simple and complex carbohydrates (Singh, Kochhar & Singh, 2010). Complex carbohydrates are slowly digested, and they can also time to absorb in the body than the simple carbohydrates. Starchy vegetables (such as potatoes and corn), peas, lentils, beans, and whole-grain are some of the food sources of complex carbohydrates (Panawalla, 2017). These foods are often the right sources of dietary fibre (Singh, Kochhar & Singh, 2010). Dietary fibre is essential in preventing type 2 diabetes, cardiovascular diseases and colon cancer (Kaczmarczyk, Miller & Freund, 2012).

A comparative study of eight countries, including the United States of America, Canada, Belgium, Ireland, Estonia, Latvia, Greece and Israel, revealed differing results in brown bread consumption (Vereecken, De- Henauw & Maes, 2005). Estonia reported the highest results, with 76% of adolescents consuming brown bread more than five times a week. Only 17% of Adolescents in America and 12% in Greece consumed brown bread more than five times a week, indicating a lower intake of brown bread a week, as brown bread will likely contain more fibre than white bread (Vereecken, De- Henauw & Maes, 2005).

In a study done by Lošić and Kenjerić (2015) in Bosnia and Herzegovina, 0.8% of the adolescent learners had eaten bread two to three times a week. The average daily consumption of bread and cereals in Iran was 7.2 servings per day (Naeeni, Jafari & Omidi, 2019). In another study done by Nabhani-Zeidan, Naja and Nasreddine (2011) in Lebanon, 58.61% of the adolescents in the lower SES group had consumed an average of seven servings of grains per day, while 47.81% of adolescents in high SES had consumed an average of six servings per day of grains. The was no indication of whether the grain was unrefined or refined. Thus we cannot measure the intake of complex carbohydrates.

2.3.7 Sugar and Food

The SAFDG recommends that people consume foods and drinks containing sugar sparingly and not between meals (Vorster, Badham & Venter, 2013). The quantity of added sugar intake amongst South Africans has risen (Steyn, Myburgh & Nel, 2012). South African adolescents had consumed 100g per day of added sugar, and most of the sugar was in the form of sweetened beverages (Steyn, Myburgh & Nel, 2012). High consumption of sugar can lead to tooth decay, CVD, obesity and type 2 diabetes mellitus (Steyn, Myburgh & Nel, 2012).

In the recent SANHANES-1 study, 27.0% of the population aged 15 to 24 years old had a score of 6-8 which was regarded as a high intake of sugar (Shisana *et al.*,2013). Furthermore, in a rural area, the sugar score was 2.26, while in informal areas, the sugar score was 3.36. Furthermore, in informal rural areas, 58.4% of the population had a score of 2.26 which was viewed as a low intake of sugar, while in urban formal areas, 43.1% of the population had a score of 3.36 in was viewed as moderate intake of sugar.

In a study done by Naeeni, Jafari and Omidi, (2019) in Iran, children and adolescents had an average daily consumption of 1.3 servings per day of sugar. However, no significant difference was observed on the sugar intake between girls and boys. Hanson and Chen (2007) reported that teenagers who belonged in lower socioeconomic status had consumed higher refined sugars. There is a direct link between high intake of sugar and obesity, dental caries, and diabetes (Steyn, Myburgh & Nel, 2012).

2.4 The Relationship between Nutrition Knowledge and Dietary Practices of Adolescent Learners

Nutritional knowledge has been shown to have a positive influence on the dietary practices of adolescents (Vereecken, De-Henauw & Maes, 2005). Sedibe *et al.* (2014) indicated that children who have more nutrition knowledge are more likely to have good consumption patterns. This has also been reported by (Packman & Kirk, 2000), who indicated that nutrition knowledge is essential for children to accept a healthy lifestyle. Adolescents who have more nutrition knowledge are more likely to have good dietary practices.

In a study done by Oldewage-Theron, Egal & Moroka (2015), higher nutrition knowledge scores were significantly associated with higher food variety score as the adolescents in the medium food variety score category had scored 62.5% compared with 58.3% in the low food variety score category. In a study conducted in Mauritania among 384 learners aged 12-19 years, 78.9% indicated that that breakfast was the most significant meal of the day, while 68% admitted that they had skipped breakfast, with six percent, reported having always skipped breakfast (Ranjana, Mahomoodally & Ramasawmy, 2013). Higher nutrition knowledge score was associated with considerably higher consumption of pasta/rice, vegetables and fruit and substantially lower consumption of sweets, snacks, fried foods, and sugary drinks (Grosso *et al.*, 2013). Improving nutritional status among adolescents may thus prove to be more complex than simply providing nutrition information. It is therefore clear that alternative efforts to support adolescents in developing good eating habits and consequently nutritional status should also be explored. The determinant of dietary practices cannot be accounted only to the knowledge of nutrition that adolescents possess. Other factors seem to influence dietary practices.

2.5. Factors that Influence Dietary Practices of Adolescent Learners

Other factors that contribute to dietary practices include eating away from home, media habits, parents influence on adolescent's food intake, peer pressure, socioeconomic status, body image, gender and age.

2.5.1 Eating Away from Home

Adolescents eat away from home due to the less time that they spend with family and more time they spend with friends (Mallick, Ray & Mukhopadhyay, 2014). Cooked foods that are sold in the markets are often high in salt, sugar and trans fatty acids (Bargiota *et al.*, 2013). Adolescents regularly purchase what is available and tastier without considering what is healthier and thus exposing themselves to poor dietary practices (Washi & Ageib, 2010). Meals that are eaten at home are healthier than meals that are eaten outside the home (Moreno *et al.*, 2010).

In a study done by Washi and Ageib (2010) in Jeddah, Saudi Arabia, 91.6% of adolescents had eaten food outside the home. Almost half of the amount of money spent by the Americans is spent on eating foods outside the home, and 32% of the

calories they consume are from food outside the home (Story *et al.*, 2008). The mother's age and educational level mothers are some of the factors that influence adolescents to eat away from home (Bargiota *et al.*, 2013).

2.5.2 Media Habits

Television exposure in food advertising is connected to subsequent fast-food consumption in adults (Story & French, 2004). The media environment has been shown to shape food-related knowledge, attitudes, preferences, and practices (Story & French, 2004). There is a straight causal connection between advertising for food products and children's diet. In particular, this connection occurs as an increase in snack food intake and overall calories and a decrease in consumption of fruits and vegetables (Kovács *et al.*, 2015).

In the United States of America, urban adolescents (80% at the age of 14; 75% aged 15; and 50% aged 17) indicated that media influenced them to consume fast foods (Vaida, 2013). In a study done by Mallick, Ray and Mukhopadhyay (2014) in Fiji, the eating behaviours of adolescents have changed after they had watched more television.Furthermore, media is associated with dieting, food avoidance, consciousness about calorie intake and concern about being overweight. Spending more time with screen activities has been associated with consuming more unhealthy snacks (Rey-López *et al.*, 2010).

2.5.3 Parents Influence on Adolescent's Food Intake

Children's food choices are influenced by their parent's feeding behaviour (Scaglioni *et al.*, 2018). Parents affect children both directly and indirectly on their food intake by adopting overt and covert control (Scaglioni *et al.*, 2018). Avoiding going to stores and restaurants which sell foods that are unhealthy and buying foods that are healthy are strategies of covert control, while restriction and pressure to eat are strategies of overt control (Scaglioni *et al.*, 2018).

Bargiota *et al.* (2013) indicated that in Greek, 93% of the adolescent in rural areas indicated that their parents controlled their food choices. About 20% indicated very much, 42% indicated quite a lot, 21% moderately and 10% not very much. Parental control was greater among young adolescents. In addition, parental control leads to

adolescents eating healthy foods. In another study done by Banna *et al.* (2016), children who were advised by their parents had a high intake of fruits, vegetables, and dairy products. In addition, children were advised by their parents to limit the consumption of sugar-sweetened beverages and also consume a variety of foods.

2.5.4 Peer Pressure

Peer pressure is very high in the course of adolescence. Adolescent tends to eat unhealthy foods such as pizzas, burgers, soft drinks, chocolates and junk foods that are sold along the roadside in order to belong in a group (Barooh,2012). They are regularly exposed to peer influence at school, which significantly impacts their perception of food and frequency of food consumption (Williams, 2013).

According to Lorasch-Gunderson (2012), 89% of the adolescent in Minnesota indicated that they compared themselves with their peers when it came to their eating disorders, and only 11% stated that they did not compare themselves to their peers. In a study done by Amos, Intiful and Boateng (2012) in Ghana, the results showed significant statistical correlation amongst poor eating habits and peer pressure. Unhealthy eating habits are caused by too much peer influence (Amos *et al.,* 2012). The Pearson correlation test showed that there was a highly statistically significant positive correlation between peer influence and eating habits (Amos *et al.,* 2012). Food chosen as a result of influence by peers may exacerbate poor eating practice.

2.5.5. Socio-Economic Status

SES can be defined as one's own access to resources such as social, human capital resources, economic and cultural (Center for Education Statistics, 2012). Lower SES households do not have enough income or wealth to protect against the harmful effects of adverse health among adult households (Leonard, Hughes & Pruitt, 2017). Adolescents from lower socio-economic status are reported to eat a less balanced diet and have been associated with a higher risk of engaging in unhealthy food consumption practices than those of higher socio-economic status (Buttriss, 2011). The reason for this could be due to affordability and cheaper foods.

In a study done by Skårdal *et al.* (2014) in Norway, adolescents from higher SES families had a higher consumption of fish and vegetables, and lower consumption of soft drinks and fast food than those from lower SES. Cheaper foods could be the reason why adolescents from lower SES had consumed a higher intake of soft drinks and fast food. Nabhani-Zeidan, Naja, and Nasreddine (2011) in Lebanon had indicated that adolescents from higher SES had consumed an average of 1.93 servings of vegetables while those from lower SES had consumed an average of 1.44 servings of vegetables.

2.5.6. Body Image

Body image is defined as the awareness of the general physical (Yadav, 2017). Good body image is important to boost the child's self-esteem (Pokrajac-Bulian & Živčić-Bećirević, 2005). Influences such as western culture and globalisation have made thin body size to look like normal and children were concerned when they did not have those thin bodies (Pokrajac-Bulian & Živčić-Bećirević, 2005). On the other hand, boys had preferred to have bodies that had a lot of muscles (Luevorasirikul, 2007).

In a study done by Bargiota *et al.* (2013) in Greek amongst boys and girls, 29% of boys and 30% of girls indicated that they had used a slimming diet so that they can be able to lose weight. Some girls had opted to skip meals to be thin (Barooah, 2012). This attitude of girls reduces their food intake and therefore, their body becomes deficient of many essential nutrients (Barooah, 2012). Thus, putting the girls at risk of developing problems such as low bone density and anaemia.

2.5.7. Gender

Women are known to follow more nutrition guidelines as compared to men (Wardle *et al.*, 2004). However, this practice appears to be evident among adolescents as well. In a study done by Simen-Kapeu, (2010), boys had eaten more fat and fewer fruits and vegetables than girls.

In a study done by Skårdal *et al.* (2014) in Norway, girls had consumed healthier foods and less unhealthy foods than boys. Girls had consumed an intake of 1.79 servings of vegetables per day, whereas boys had consumed an intake of 1.29 servings of vegetables per day. Soft drinks consumptions were 0.25 litres per week for girls and 0.5

litres a week for boys. In the USA, 62% of males reported that they consumed soda one or more times in the previous day while 55% of females consumed soda one or more times in the previous day (Ranjit *et al.*, 2010). Another study was done by Lošić and Kenjerić (2015) in Bosnia and Herzegovina, 80.6% and 80.2% of girls had eaten fruit and vegetables on a daily basis respectively, while 67.4 % and 54.5 % of boys had eaten fruit and vegetables on a daily basis respectively. Girls are mostly concerned with their body image than boys which explains why they eat healthier than them.

2.5.8 Age

Food and drink choices of children seem to changes as they move from childhood to adolescent (Henningsen, 2011). Official nutrition recommendations are met by few adolescents (Rasmussen *et al.*, 2006). Once entering adolescence, the consumption of unhealthy food types increases while the consumption of vegetables and fruits often declines (Rasmussen *et al.*, 2006). A study done by Bere *et al.* (2008) in Norway amongst adolescents, found that children who were in 10th grade had consumed more soft drinks in a week as compared to the adolescents that were in 9th grade. While it may seem like increased age is correlated to the adoption of unhealthy eating practices, Grosso *et al.* (2013), reported contrary results. His research stated that older age children were independently related to a higher intake of vegetables and fruits.

2.6 Possible Strategic Intervention to Improve Nutrition Knowledge and Good Dietary Practices

Governments and Non-Governmental Organisation have designed strategies that could be used to promote good dietary practices. Nutrition education and integrating nutrition topics into school core curricular are among the strategic intervention geared towards improving knowledge and healthful eating.

2.6.1 Nutrition Education

Nutrition education is defined as any set of educational approaches that are supplemented by environmental supports required to enable good food choices and nutrition behaviours that help with good well-being and also health (Kattelmann, 2014). It has been revealed that nutrition education can improve the nutritional

knowledge and practices of individuals hence improving their nutritional status (Lanerolle & Atukorala, 2006).

A major increase was seen in nutrition knowledge after conveying nutrition education to female adolescents belonging to a rural and urban area of District Kurukshetra (Arora, 2016). Before communicating nutrition education, the correct responses of adolescent belonging in rural areas about the awareness of energy-yielding foods was 26.7%, and then after conveying nutrition education, the correct answers changed to 68%. Adolescent in urban areas had 14.7% of the right answers on the awareness of energy-yielding foods before nutrition education message, and the correct answers changed to 78.7% after imparting nutrition education (Arora, 2016).

In a study done by Perveen (2017) amongst adolescents in Pakistan, the overall mean score of an adolescent with respect to knowledge about nutrition was 72.67% before the intervention, and then after the intervention, it improved to 82.44%. Another study done by Schmidt (2010) in Michigan, it was found that students who took a nutrition education class consumed considerably more food rich in dietary fibre, as well as certain vitamins and minerals than those who did not take nutrition education classes. In addition, the amounts of these nutrients consumed by the nutrition education group were closer to the Dietary Reference Intake (DRI). Nutrition education is likely to increase nutrition knowledge and possibly the intake of vital nutrients.

2.6.2 Integrate Nutrition Topics into One Core Curricular

It has been shown that subjects such as Science, English, Geography and English literature need to be integrated into nutrition to improve the core curriculum (Sadegholvad *et al.*, 2017). In addition, Sadegholvad *et al.,* (2017) indicated that there will be a small chance whereby nutrition subject will be a stand-alone at the school curriculum. In a study done by Carraway-Stage *et al.,* (2015) to investigate the impact of integrating nutrition with science subjects in schools, the nutrition knowledge of the four graders improved by an average of 16.75 percentage points, ranging from 1.4 % to 46.32% after the intervention. Studies above show that integrating nutrition topics with other school subjects will improve the nutrition knowledge of adolescents.

2.6.3 Pre-Service and In-Service Training of Schoolteachers about Nutrition

Nutritionists, dietitians, and home economists should train and re-train school teachers about the importance of nutrition topics to allow them to transfer correct and updated information to students (Sadegholvad *et al.*, 2017). In a study done by Sharma *et al.* (2013) amongst 181 USA teachers, who were responsible for teaching nutrition education to one million children from lower socio- economic families, findings showed that 3% of teachers answered four out of five nutrition knowledge questions accurately, 54% agreed that it was difficult to differentiate which nutrition information was trustworthy, and only 9% of teachers reported they followed healthy dietary behaviours. The study indicates that nutrition knowledge among teachers responsible for teaching nutrition is lacking.

2.7 Summary of Literature Review

Failure to consume an adequate diet will have an adverse impact on the growth and development of the adolescent. Changes in our environment, income, and peer pressure influences the choice of food. Most adolescents adopt poor dietary practices which can lead to health problems such as iron deficiency, cardiovascular, type 2 diabetes, eating disorders, obesity, undernutrition, and dental caries.

Nutritional knowledge and nutrition education influences dietary habits and food preferences of adolescents. Other studies did not report a positive correlation between nutrition knowledge and good dietary practices, indicating the need for the implementation of other strategies, such as creating a conducive environment for healthy eating. There is a need for increased nutrition education to the school learner, as well as selling healthy meal options in the school premises. Educating adults on the South African Food Based Dietary Guideline in community gatherings such as churches, clinics, and other social meetings will also assist in spreading the message of good eating practices.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The following section presents the research design, study population, instrument development, data collection, ethical considerations, statistical analysis and dissemination of the results.

3.2 Research Design

The study design was a cross-sectional descriptive and exploratory. Cross-sectional studies are carried out at a one-time point or over a short period (Levin, 2006). The quantitative research method was used because the intention was to look at quantities of variables used in this study (Leedy & Ormrod, 2010:94). The exploratory nature of this study involves determining the relationship between nutrition knowledge and dietary practices.

3.3 Study Area and Population

3.3.1. Study Population

The study population included adolescent learners aged 13 to 18 years in the Polokwane Municipality of the Capricorn District in Limpopo Province. It included adolescent boys and girls who are in grade 8 to grade 11 of the South African schooling system.

3.3.2. Study area

The study was conducted in the Polokwane Municipality located in the Capricorn District of Limpopo Province. The Capricorn district has five municipalities, namely Aganang, Polokwane, Molemole, Lepelle-Nkumpi and Blouberg (Figure 3.1).

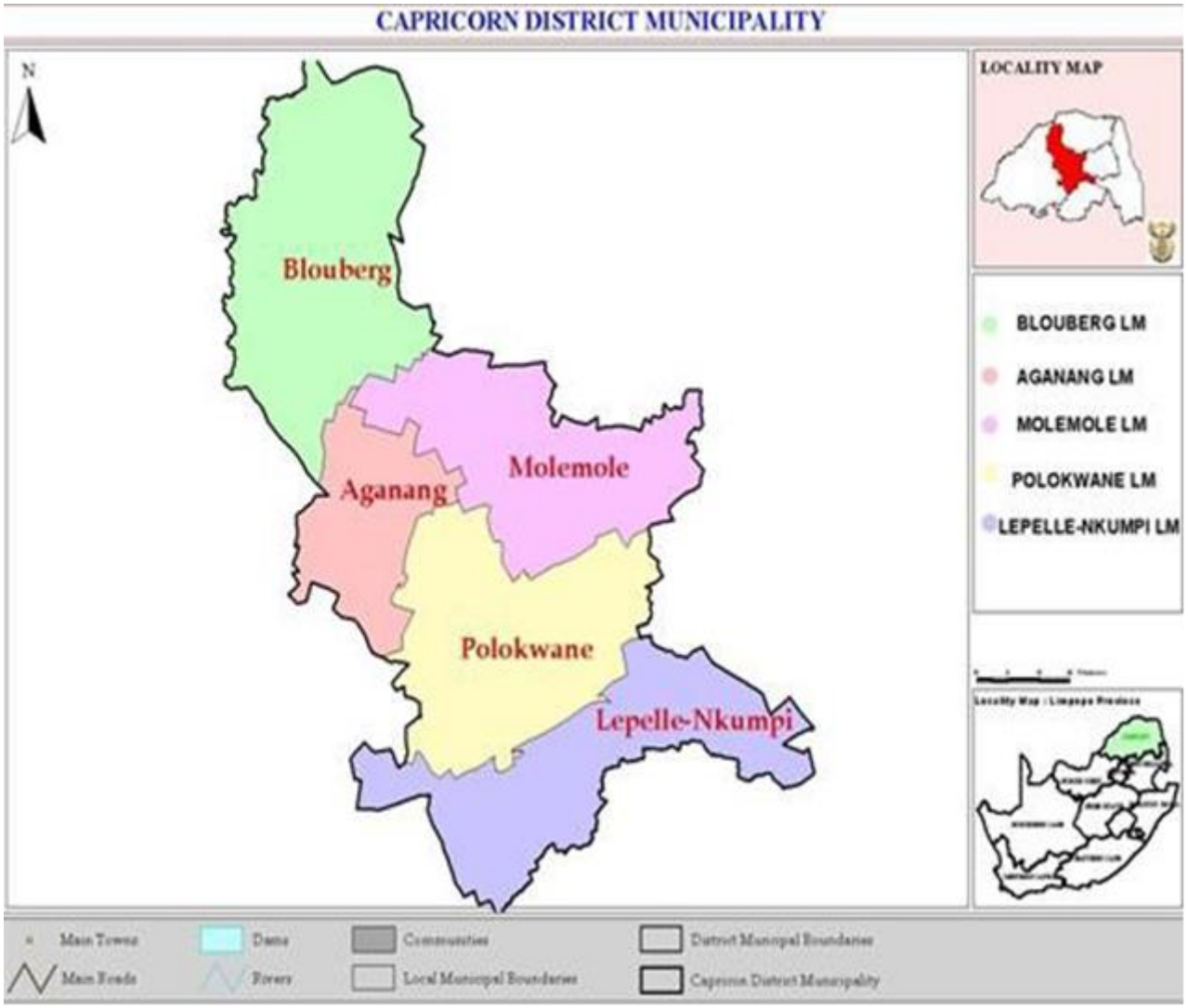


Figure 3.1: Map of Capricorn District

Polokwane Municipality is situated in the central part of the Limpopo Province. It shares its name with the capital city of the Limpopo Province. Polokwane municipality is divided into 10 education circuits (Department of Basic Education, 2017). The Polokwane Municipality consisted of 96 secondary schools with 51835 learners in Grades 8 to 12 (Department of Basic Education, 2017).

3.3.3 Sample selection

Six secondary schools were randomly selected from the Polokwane Municipality. The schools were divided into different demographics such as rural, township and town. Three schools were selected from rural settings as it represented the majority of the population.

Two schools were chosen from the township and one school from town. In brief, the researcher had assigned numbers to each school in the Polokwane Municipality, cut them into pieces and placed them inside a box. The researcher then picked six pieces from the box. The schools corresponding to the numbers selected were later included in the study.

Slovin formula was used to determine the appropriate sample size for this study (Stephanie, 2013). The formula is stated as follows: The sample size $n=N/(1+(N \times e^2)$ where n= sample size, N= total number of adolescents in the area under study, e= the accepted level of error

$n = N/ (1 + (N X e^2)$
$n = 51835/ (1+ (51835 \times 0.05)$
$n=51835/(1+(51835x0.0025)$
$n = 51835/130.59$
$n=399$

A total number of 450 adolescent learners were selected to participate in the study to allow for attrition. In each school, a total number of 75 adolescent learners were included. The researcher used a cluster sampling method to select the number of learners per school. Cluster sampling is a probability sampling in which a group of population elements constitutes the sampling unit, instead of a single element of the population (Saifuddin, 2009). Figure 3.2 shows the number of adolescent learners that participated in the study.

.

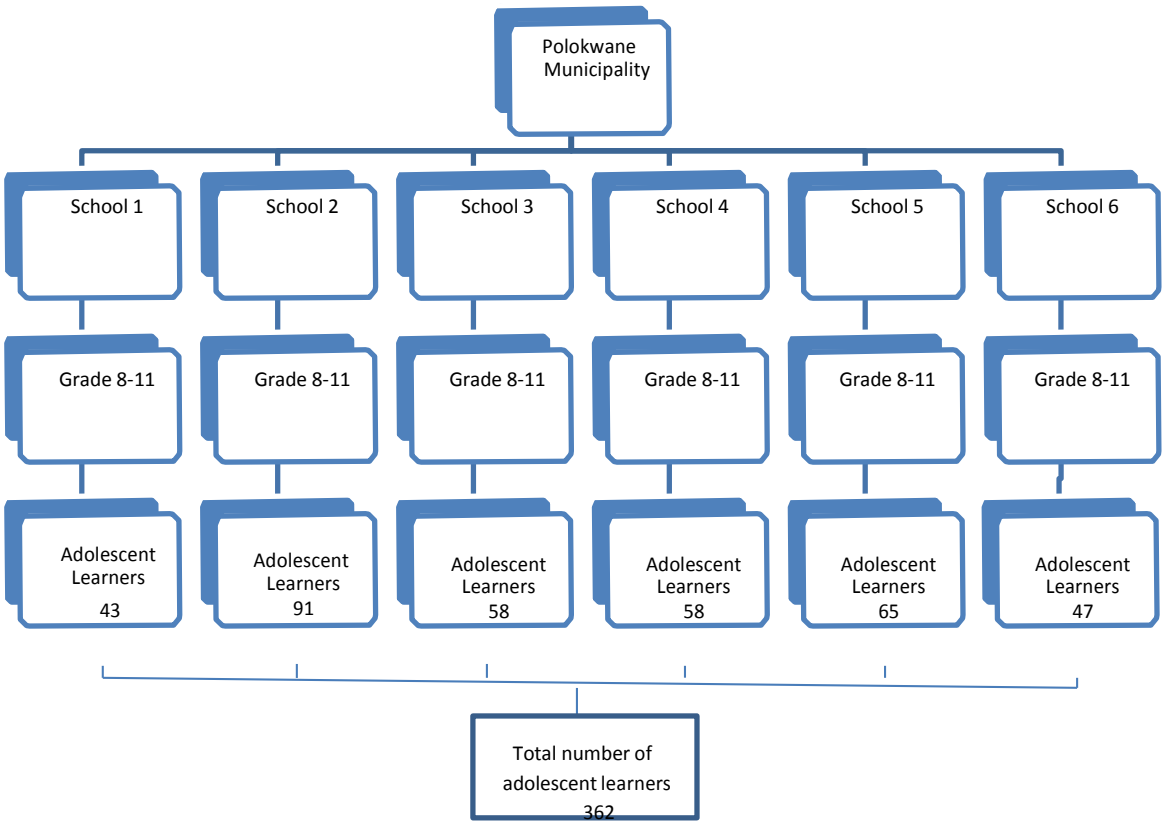


Figure 3.2: Number of Adolescent Learners from Participating Schools

3.3.4 Subject Recruitment

This section will discuss the three visits that the researcher had embarked on to recruit the participants.

Visit one

The researcher visited the Limpopo Provincial Department of Education and the Department of Education, Capricorn District to ask for permission to conduct the study before its commencement. The researcher had obtained the list of all Secondary Schools from the Limpopo Provincial Department of Education.

Visit two

The researcher had telephonically contacted school principals of the six schools to make an appointment. The visits then occurred. Approval letter from the provincial and district was given to school principals after securing an appointment. Sampling was conducted during this visit. The researcher was given an opportunity to present the research

procedures to adolescent learners. The Consent forms (Appendix 1) were then given to the selected learners that had verbally agreed to participate in the study to give to their parents to sign on their behalf. Five hundred learners agreed to participate and those that refused to participate were excluded. The learners were given an instruction to return the consent forms during the day of data collection.

Visit three

This final visit was for data collection.

3.3.5 Inclusion

The study included adolescent learners aged 13 to 18 years.

3.3.6 Exclusion

Grade 12 adolescent learners were excluded.

3.4 Measurements

Variables and techniques used in the study are described in the following section.

3.4.1 Variables

A variable is a property that takes two or more values and is subject to change, while a constant has one value only (Welman, 2005:16). The variables that were measured in this study included socio-demographic information, nutrition knowledge, dietary practices of adolescent learners.

3.4.1.1 Socio-Demographic Information

Socio-demographic information refers to the characteristics of the selected adolescent learners. The following characteristics measured Socio-Demographic Information of adolescent learners: age, gender, place of residence, parent's marital status, parents educational background and socioeconomic factors such as family income, access to electricity and water source and source of fuel used for cooking.

3.4.1.2 Nutrition Knowledge

Nutrition knowledge in this study refers to whether adolescent has nutritional knowledge on SAFBDG (Vorster *et al.,* 2013) and general guidelines on healthy eating (Narayan, 2013). Nutrition knowledge was measured by a knowledge test whereby the adolescent learners were graded upon completion. A Likert scale in Table 3.1 was used to clarify the level of nutrition knowledge. Adolescent learners who scored 50 to 100% will be regarded as having adequate nutrition knowledge, while those that will score between zero to 49% will be regarded as having poor nutrition knowledge. The marking guide that was used is attached (Appendix 2).

Table 3.1 Level of Nutrition Knowledge of Adolescent Learners

Marks (%)	Description of competence
80-100	Outstanding
70-79	Meritorious
60-69	Substantial
50-59	Adequate
40-49	Moderate
30-39	Elementary
0-29	Not achieved

3.4.1.3 Dietary Practices

Dietary practice refers to the usual intake of a nutrient or food. Usual is defined as the average of daily nutrient intakes aggregated over all foods consumed (Roodenburg *et al.,*2013). intake Usual intake Dietary practices were measured by dietary patterns, habits questions such as how many times learners had skipped breakfast in a week, skipped lunch in a week, skipped supper in a week and the food frequency questionnaire (FFQ). FFQ asked questions such as the number of times fruits, vegetables, legumes, starch, meat, milk and milk products were consumed in a week, The 24-hour recall (Appendix 3) was used to develop the list of food items that were included in the FFQ.

.

3.4.2 Techniques

The general questionnaire (Appendix 4) had consisted of socio-demographic information (Section A), Nutrition Knowledge Questionnaire (Section B), dietary practice questionnaire (Section C) and FFQ (Section D).

3.4.2.1 Socio-Demographic Information

Socio-demographic information was adapted from the questionnaire of the study titled: Nutritional status and dietary intake of adolescent girls in Mandlenkosi High School (Silangwe, 2012) (Appendix 4, Section A).

3.4.2.2 Nutrition Knowledge Questionnaire

Nutrition Knowledge Questionnaire was derived from the South African Food-Based Dietary Guidelines (FBDG) and also from the study titled: development of a reliable and valid nutritional knowledge questionnaire for urban South African adolescents (Whati, 2005) (Appendix 4, Section B).

3.4.2.3 Dietary Practice

Dietary practice questionnaire was adapted from the study titled: Ghananian Junior High School adolescents' dietary practices and food preferences: Implications for public health concern (Buxton, 2014) (Appendix 4, Section C).

3.4.2.4 Food Frequency Questionnaire

The Food Frequency Questionnaire was adapted from the questionnaire of the study titled: An assessment of the nutritional status of children on primary school nutrition programme in the Polokwane Municipality, Limpopo Province (Malongane, 2009) (Appendix 4, Section D).

3.4.3 Pilot Study

According to Schneider *et al*. (2004:133), a pilot study is a minor study conducted before a larger study of the research to decide if methodology, sampling, instruments, and analysis are adequate and appropriate. One fieldworker and researcher conducted a pilot study in one secondary school that was randomly selected from Polokwane municipality. A pilot study was done to 15 adolescent learners from the selected school. Convenience sampling method was used to select the learners at the school. All learners at the school were given an opportunity to participate in the study, but only those who agreed to be interviewed during the day of data collection were included. After the pilot study, questions and procedures were modified. The following changes were made after the pilot study:

- Question 21
  - Before: How many fruits should you eat daily?

- After: How many fruits and vegetables should you eat every day?

- Question 41
  - Before: Do you take breakfast in the morning?
  - After: Do you eat breakfast before going to school?
- A list of foods such as vienna, achaar, polony, russian and potato chips was listed by participants in the 24-hour recall and these items were then added to the existing FFQ.

3.4.4 Validity

Validity is an expression of the degree to which a measurement is a true and accurate measure of what it purposes to measure (Leedy & Ormrod, 2005:28). The pilot study of this research were used to establish the validity of the set instrument. Secondly, instruments from similar researchers were used as a guide in designing the proposed instrument. Thirdly, professional instrument verification was solicited from both the project supervisors. Finally, project evaluation by the Department of Life and Consumer Sciences vetting committee offered yet another professional avenue for the scrutiny of the research instrument. The researcher also ensured validity by communicating with adolescent learners using their local language during data collection. The validity was strengthened by training the research assistant on how to help the learners during data collection. The nutrition knowledge questionnaire was developed from a pretested questionnaire.

3.4.5 Reliability

Reliability is the stability in which a measuring instrument yields a certain result when the entity being measured has not changed (Leedy & Ormrod, 2005:29). The researcher was available during data collection, which ensured correct supervision of the data collection process and that adolescent learners had not shared information during the completion of the questionnaire. To ensure reliability, learners from the same grade filled the questionnaires on the same day.

3.5 Training of Field Worker and Responsibilities of the Researcher

This section will discuss the training of field worker, responsibilities of the researcher and finally, the responsibility of the field worker.

3.5.1 Training the Field Worker

Final year nutrition student from the University of South Africa who was able to speak and write in Sepedi was recruited as a field worker. The researcher trained the field worker for 5 days. The fieldworker was trained on the completion of the socio-demographic information, nutrition knowledge questionnaire, dietary practice and food-frequency questionnaire.

3.5.2 Responsibilities of the Researcher for Data Collection

The researcher was responsible for training field worker in data collection procedures (how to complete a questionnaire), responsible for administering section D of the questionnaire and finally, responsible for the overall supervision of the data collection process.

3.5.3 Responsibility of the Fieldworker

The fieldworker was responsible for administering section D of the questionnaire.

3.6 Data Collection Procedure

The researcher and a trained fieldworker, who was a final year nutrition student, collected data through a self-administered questionnaire. The fieldworker could eloquently speak and write in Sepedi. Data from five schools were collected during school times, and the 6th school, data were collected after school. Section D of the questionnaire was administered by the researcher and field worker. Each participant was interviewed for approximately 10 minutes.

3.7 Institutional Approval

Ethical approval was obtained from the College of Agriculture and Environmental Sciences (CAES) general research ethics review committee at the University of South Africa (UNISA) (Appendix 5). Permission was granted from the Limpopo Provincial Department of Education after the ethical approval was issued by UNISA (Appendix 6). The district office then granted permission following the permission from the Provincial Department (Appendix 7). The circuit office granted permission to proceed with the study (Appendix 8). And lastly, we were offered permission from the secondary schools (Appendix 9).

3.8 Ethical Considerations

No subjects were enrolled in the study until the research proposal, the consent form (appendix 1) and Subject Information Sheet (Appendix 10) was approved in writing by the UNISA Higher Degree Ethics Committee. The study was performed in accordance with the principles as stipulated in the Unisa policy on research ethics and the laws of South Africa. No participant entered the study without signing informed consent after a full and adequate oral and written explanation of the study, including possible risks, had been provided by the investigator. Subjects had the right to withdraw from the study at any stage without stating a reason, and research personnel may also withdraw a subject from the study at any time. Data generated from the study were stored in a computer database, in a manner that maintains the subjects' confidentiality. For data verification and quality control purposes, regulatory authorities and/or members of the UNISA Higher Degree Ethics Committee may be allowed to access participants' data under conditions of strict confidentiality. The anonymity of participants is ensured in any publication of the data.

3.9 Statistical Analysis

Data were cleaned, coded and entered into Microsoft Excel 2010 and imported to Statistical Package for Social Sciences (SPSS) version 21 for analysis. Data were cleaned manually. The results were analysed using descriptive statistics such as means, standard deviations, and percentages. The Chi-Square test was used to determine the relationship between nutrition knowledge and dietary practice.

3.10 Dissemination of the Results

The researcher will present the findings of the study before the Department of Life and Consumer Science at the University of South Africa. A copy of the dissertation will be submitted to the library of the University of South Africa. Feedback will be made available to the Limpopo Provincial Department of Education through the presentation. And also through the submission of a copy of a dissertation. Feedback will be made available to the participants through presentation and discussion. The researcher will also share

information with other professionals in the workplace. The research findings will be presented at national and/or international conferences and will be published as an article in an accredited journal.

CHAPTER FOUR RESULTS

4.1 Introduction

This chapter presents the results of the study. The presentation includes socio-demographic information, nutrition knowledge, dietary practice and the relationship between nutrition knowledge and dietary practice.

4.2 Socio-Demographic Information

Table 4.1 shows the socio-demographic information of adolescent learners. A total of 362 adolescent learners took part in this study. Females were 59.1%. More than half (51.9%) adolescent learners were aged 17 to 18 years old, and 32.9% were aged 15 to 16 years old. Most of the participants (53.0%) were in Grade 11, while 21.1% were in Grade 10. The majority of the learners (72.9%) were staying in villages, while 18.8% were staying in townships.

Table 4.1: Socio-Demographic Information (n = 362)

	Number (n)	Percentage (%)
Gender		
Male	148	40.9
Female	214	59.1
Age		
13-14	55	15.2
15-16	119	32.9
17-18	188	51.9
Grade		
8	69	19.0
9	25	6.9
10	76	21.1
11	192	53.0
Place of residence		
Town	26	7.2
Township	69	19.1
Village	267	73.7

Table 4.2 shows that nearly half (46.1%) adolescent learners were staying with both of their parents, while 39.2% were staying with just their mothers

Table 4.2: The Person Adolescent Learner Stays with at Home (n=362)

The person adolescent learner stays with at home	Number (n)	Percentage (%)
Mother	142	39.2
Father	12	3.3
Both parents	167	46.1
Legal guardian	16	4.4
Alone	10	2.8
Aunt	3	0.8
Granny	11	3.0
Sister	1	0.3

Table 4.3 shows information about parents. Nearly two-thirds of parents (63.8%) were married or staying together in a relationship, while 36.2% were single (23.8% and 12.4% either divorced or widowed). The majority of mothers had secondary education (75.2%); meanwhile, 17.1% had tertiary education. The majority of fathers (70.4%) had secondary education, while 14.1% had tertiary education. More than half of mothers were employed (57.2%), and 36.2% was in the private sector while 16.3% were in the public sector. Most (61.3%) of fathers were employed, and 40.9% were in the private sector; meanwhile, 7.5% was self-employed.

Table 4.3: Information about parents (n=362)

	Number (n)	Percentage (%)
Marital status of parents		
Married/Living together	231	63.8
Single/never married	86	23.8
Divorced/widowed	45	12.4
Educational background of the mother		
Never attended	6	1.7
Grade 1-4	3	0.8
Grade 5-7	9	2.5
Grade 8-10	30	8.3
Grade 11-12	242	66.9
Tertiary	62	17.1
Don’t know	10	2.8
Educational background of the father		
Never attended	6	1.7
Grade 1-4	4	0.6
Grade 5-7	5	1.4
Grade 8-10	41	11.3
Grade 11-12	214	59.1
Tertiary	51	14.1

Don’t know	41	11.3
Mother employment status		
Employed	207	57.2
Unemployed	143	39.5
Don’t know	12	3.3
Type of employment of a mother		
Self-employed	17	4.7
Private sector	131	36.2
Public sector	59	16.3
Father employment status		
Employed	222	61.3
Unemployed	90	24.9
Don’t know	50	13.3
Type of employment of a father		
Self-employed	27	7.5
Private sector	148	40.9
Public sector	47	12.9

Table 4.4 below shows the household information. Almost all adolescent learners (98.3%) had access to water. The primary source of water was tap (93. 9%). **The majority of adolescent learners indicated that their households were using electricity as the main source of cooking fuel** (80.7%), while 11.9% were using firewood. Most (56.1%) of adolescent learners reported that their mothers were responsible for food preparation at home, while 20.5% said that their relatives were responsible for food preparation.

Table 4.4: Household information

Access to water	**Number(n)**	**Percentage**
Yes	356	98.3
No	6	1.7
The primary source of water		
Borehole	13	3.6
Tap	340	93.9
Dam/River	3	0.8
Source of cooking fuel		
Electricity	292	80.7
Gas	21	5.8
Paraffin	6	1.7
Firewood	43	11.9
The person responsible for food preparation		
Mother	203	56.1

Father	8	2.2
Sister	47	13.0
Brother	11	3.0
Learner	85	23.5
Aunt	3	0.8
Granny	5	1.5

Table 4.5 shows that the majority of adolescent learners were taught about nutrition (79. 0%). The primary source of nutrition information were teachers (47.8%), while 19.1% heard from televisions.

Table 4.5: Nutrition education (n=362)

	Number (n)	Percentage (%)
Learners taught about nutrition		
Taught	286	79.0
Not taught	76	21.0
Source of nutrition information		
Radio	13	3.6
Television	69	19.1
Magazine	21	5.8
Teacher	173	47.8
Internet	1	0.3
Television and teacher	9	2.5

4.3 Nutrition Knowledge of Adolescent Learners

Table 4.6 shows that almost two-thirds of adolescent learners had **adequate nutrition knowledge** (61.6%), while 38.4% had poor nutrition knowledge.

Table 4.6: Level of Nutrition Knowledge of Adolescent Learners(n=362)

Marks (%)	Description of competence	Number (n)	Percentage (%)
80-100	Outstanding	2	0.6
70-79	Meritorious	7	1.9
60-69	Substantial	34	9.4
50-59	Adequate	180	49.7
40-49	Moderate	56	15.5
30-39	Elementary	62	17.1
0-29	Not achieved	21	5.8

4.4 Nutrition Knowledge Data

Table 4.7 shows nutrition knowledge data. More than half of adolescent learners (54.4%) chose option 4 (i.e., all of the above), which includes: 1) cooked meat/ fish/ chicken sold on the street may not always be safe to eat because it may have been undercooked, 2) the cook may not have used fresh meat, and 3) it may have been kept for a long time before being cooked while 30.4% indicated that it might have been kept for a long time before being cooked. Almost half (47.5%) of the adolescent learners indicated 7 to 9 glasses of water as an amount that should be drank per day, while 0.3% reported that water should not be drank per day. One third (30.7%) of the adolescent learners indicated 1 cup as a portion of cooked vegetables, while 26.5% indicated one tablespoon of cooked vegetables. Adolescent learners who indicated one fruit and vegetable as the number of fruits and vegetables that should be consumed per pay was 44.8%, and only 11.6 % reported the correct portion of five fruit and vegetable servings per day.

Almost (43.6%) of the adolescent learners indicated popcorn as a low-fat snack, while 12.7% stated simba chips. More than half of the adolescent learners (59.9%) indicated foods such as apples, bananas, spinach, carrots as foods that should be eaten the most every day. In comparison, more than a quarter 25.1% indicated foods such as bread, samp, rice, porridge should be eaten every day. The majority of adolescent learners (86.5%) indicated that the body needs a little bit of salt to be healthy, while less than a quarter of 13.5% reported that the body does not require a little bit of salt to be healthy.

The majority of adolescent learners (85.9%) indicated that it is not healthy to snack on foods that contain a lot of sugar. More than a quarter (37.6%) of the adolescent learners indicated that balanced diet consists mostly of meat, with smaller amounts of starch, fruits, vegetables and dairy products. Nearly two-thirds of adolescent learners (63.3%) indicated that it is healthy to eat a lot of different kinds of foods than eating only a few kinds of foods. More than half of the adolescent learners (58.8) indicated that it is impossible to get all the vitamins and minerals you need from food, you need to take vitamins and minerals pills. Adolescent learners who indicated that weet-bix with 2% fat milk as a breakfast menu that contains little fat were 51.4%, while 12.2% indicated whole-wheat toast. More than a quarter (28.7%) of adolescent learners showed that

peas, lentils, and beans are essential because they comprise only small amounts of fat, while 19.9% indicated that they contain fibre. More than two-thirds of adolescent learners (68.5%) indicated that peas, lentils, and dry beans ought to be eaten often.

About one-third (35.4%) of the adolescent learners indicated that a fundamental way of healthy eating is to eat certain kinds of foods in moderate or small amounts. In comparison, 34% reported that by eating many different types of foods. More than half (54.1) of the adolescent learners indicated brown bread as the food that has most fibre, while 32.0% % indicated whole-wheat bread as the food with most fibre. About 57.5% of adolescent learners indicated that milk and yoghurt contain a lot of calcium, and only 16.6% indicated that chicken and eggs contain a lot of calcium.

Almost all adolescent learners indicated that foods that contain sugar and sugar should be eaten in small amounts (90. 9%). The majority of adolescent learners (72.7%) indicated that lentils, peas and dry beans are a healthy choice to eat in place of meat. Adolescent learners who mentioned that you cannot eat as much as you want every day amounted to 73.8%.

Table 4.7: Nutrition knowledge data (n=362)

Why cooked meat/ fish/ chicken sold on the street may not always be safe to eat	**Number (n)**	**Percentage (%)**
It may have been undercooked	18	5
The cook may not have used fresh meat	37	10.2
It may have been kept for a long time before being cooked	110	30.4
All of the above	197	54.4
Why you should not have starches at most meals		
They cause disease	88	24.3
Even eating small amounts can cause weight gain	142	39.2
They are not important for your health	57	15.7
None of the above	75	20.7
Amount of water to drink per day		
You don't have to drink water everyday	3	0.3
1 to 3 glasses	72	19.9
4 to 6 glasses	115	31.8
7 to 9 glasses	172	47.5
The portion of cooked vegetables		
1 tablespoon	96	26.5
half a cup	104	28.7
1 cup	111	30.7
2 cups	51	14.1
Number of fruits and vegetables per day		
1 fruit and vegetable a day	162	44.8
3-4 fruit and vegetables a day	157	43.4

5 or more fruits and vegetable every day	42	11.6
There is no need to eat fruits and vegetables daily	1	0.3
Type of snack that has low fat		
Simba chips	46	12.7
Popcorn	158	43.6
Fried chips	36	9.9
Niknaks	122	33.7
Group of foods		
Apples, bananas, spinach, carrots	217	59.9
Bread, samp, rice, porridge	91	25.1
Milk, yoghurt, cheese	18	5
chicken, fish, beans, eggs	36	9.9
The body needs a little bit of salt to be healthy		
True	313	86.5
False	49	13.5
Healthy to snack on foods that contain a lot of sugar		
True	51	14.1
False	311	85.9
Composition of a balanced diet		
Consist typically of meat, with smaller amounts of starch, fruits, vegetables, and dairy products	136	37.6
consists mostly of starches, vegetables, and fruits, with smaller amounts of meat and dairy products	112	30.9
consists mostly of vegetables, and smaller amounts of meat and dairy products	100	27.6
None of the above	14	3.9
Eating a lot of different kinds of foods is healthier than eating only a few kinds of foods		
True	229	63.3
False	133	36.7
It is impossible to get all the vitamins and minerals you need from food, you need to take a vitamin and mineral pill		
True	149	58.8
False	213	41.2
Group of nutrients		
Fibre, Vitamin A	184	50.8
Starches, fat, Vitamin D	89	24.6
Fats, Iron, Calcium	34	9.4
None of the above	55	15.2
Breakfast menus that contain little fat		
Whole –wheat toast with thinly spread margarine	4	12.2
Weet-Bix with 2% fat milk	18	51.4
Bacon and egg	6	17.1
1 and 2	7	19.3
Why beans, peas, and lentils are good for you?		
They comprise only small amounts of fat	104	28.7
Comprise a lot of fibre	72	19.9

Protect you from some diseases	86	23.8
All of the above	100	27.6
Peas, lentils, dry beans should be eaten often		
True	248	68.5
False	114	31.5
Key to a healthy way of eating		
Eat many different kinds of foods	123	34
Eat some foods more than other foods	44	12.2
Eat certain kinds of foods in a moderate or small amount	128	35.4
All of the above	67	18.5
Type of food that has the most fibre		
White rolls	17	4.7
Brown bread	196	54.1
White bread	33	9.1
Whole wheat bread	116	32.0
Type of food that contains a lot of calcium		
Chicken and eggs	60	16.6
Milk and yogurt	208	57.5
Pilchards	38	10.5
1 and 3	56	15.5
Foods that contain sugar and sugar should be eaten in small amounts		
True	329	90.9
False	33	9.1
Lentils, peas and dry beans are a healthy choice to eat in place of meat		
True	263	72.7
False	99	27.3
Eat as much as you want everyday		
True	95	26.2
False	267	73.8

4.5 Dietary Practice

Table 4.8 shows that almost three-quarters of adolescent learners (74.0%), indicated that they were eating breakfast before going to school. Of those that did not eat breakfast before going to school, 10 % stated that they did not eat breakfast because breakfast was not prepared at home, while 5% indicated that they did not like to eat breakfast (2.8%).

Table 4.8: Eating Breakfast before Going to School (n=362)

	Number (n)	Percentage (%)
Do you eat breakfast before going to school?		
Yes	268	74
No	94	26
The reason you do not eat breakfast		
Breakfast not prepared at home	35	10
Fear of being late for school	29	8.0
Parents give me money to buy food on the way to school	16	4.4
I prefer to buy food out from home as my breakfast	4	1.1
Don't like to eat in the morning	10	2.8

Table 4.9 shows that above one-quarter of adolescent learners (37.3%) indicated that they had skipped breakfast in the past week, while 5.5% stated that they had skipped breakfast 5 to 6 times per week. More than half of adolescent learners had not skipped lunch in the past week (58.6%), while 3.9% indicated that they did not have lunch for the whole week. More than two-thirds of adolescent learners (66.9%) had not skipped supper in the past week, while 2.2% indicated that they did not eat supper every day in the past week.

Table 4.9: Number of Times Skipped Breakfast, Lunch and Supper in the Past Week (n=362)

	Number (n)	Percentage (%)
Number of times skipped breakfast		
Not skipped	135	37.3
1-2 times per week	112	30.9
3-4 times per week	52	14.4
5-6 times per week	20	5.5
7 times per week	43	11.9
Number of times skipped lunch		
Not skipped	212	58.6
1-2 times per week	85	23.5
3-4 times per week	41	11.2
5-6 times per week	10	2.8
7 times per week	14	3.9
Number of times skipped supper		
Not skipped	242	66.9
1-2 times per week	75	20.7
3-4 times per week	29	8.0
5-6 times per week	8	2.2
7 times per week	8	2.2

Table 4.10 shows that about one-third of adolescent learners had consumed two cooked meals per day (33.4%), while more than a quarter had consumed three meals per day (26.2%).

Table 4.10 Number of Cooked Meals Consumed in a Day (n=362)

	Number (n)	Percentage (%)
1 meal	114	31.5
2 meals	121	33.4
3 meals	95	26.2
4 meals	13	3.6
More than 4 meals	19	5.2

Table 4.11 shows that more than two-quarter of adolescent learners (68.0%) indicated that they did not bring food from home to school. The types of food usually brought from home to school were mainly biscuits, cakes, bread and canned or packaged fruit juice (8%).

Table 4.11: Food Brought from Home to School (n=362)

	Number (n)	Percentage (%)
Bring food from home to school		
Yes	116	32.0
No	246	68.0
Type of food brought from home to school		
Canned or packaged fruits juice	29	8
Cookies, cakes, and bread	76	21.0
Boiled rice	3	0.8
Samp	1	0.3
Fruits and snacks	3	0.8
Sweets	2	0.6
Pap and meat	1	0.3
Canned or packaged fruits juice and Cookies, cakes and bread	1	0.3

Table 4.12 shows that the majority of adolescent learners indicated that they were buying snacks during lunch breaks (86.2%), while 13.8% stated that it did not buy. The types of snacks mainly consumed by learners were simba chips (35.4%), fruits (22.7%) and sweets (13.8%).

Table 4.12: Snacks Usually Bought during Lunch Breaks (n=362)

	Number (n)	Percentage (%)
Usually, buy snacks during lunch breaks		
Yes	312	86.2
No	50	13.8.
Types of snacks usually bought during lunch breaks		
Ice cream	18	5.0
Sweets	50	13.8
Simbas	128	35.4
Fruits	82	22.7
Bunny chow/Kota	25	6.9
Soft drinks	5	1.4
Vetkoek	2	0.6
Biscuits	2	0.6

4.6 Frequency of food intakes

This section will introduce intake of fruit, vegetable, starch, dairy and dairy products, protein foods, legumes and peanuts, miscellaneous, soft drinks and bread spread.

4.6.1 Fruit Consumption

Table 4.13 shows that apples and banana were mainly consumed 1-3 times in a week while orange and pear were least consumed. Only 26.2% of adolescent learners had consumed apples 4-7 times per week.

Table 4.13: Frequency Consumption of Fruits (n=362)

Frequency of food items per week	Apple	Banana	Orange	Pear
1-3 times	55.2	44.2	43.7	21.3
4-7 times	26.2	13.5	16	6.6
Never	18.5	42.3	40.3	72.1

4.6.2 Vegetable Consumption

Table 4.14 shows that almost three quarters (67.4%) of adolescent learners had not consumed Morogo in a week. Only 11.4% of adolescent learners had consumed cabbage 4-7 times in a week.

Table 4.14: Frequency Consumption of Vegetables (n=362)

Frequency of food items per week	Spinach	Carrots	Cabbage	Morogo	Beetroot	Pumpkin
1-3 times	39.8	38.4	45.5	25.5	36.5	30.7
4-7 times	6.9	15.2	11.4	7.1	13.5	6.1
Never	53.3	46.4	43.1	67.4	50	63.2

4.6.3 Consumption of Starch

More than half (58.8%) of the adolescent learners had consumed porridge 4-7 times per week. Only 2.5 % and 6.6 % of learners reported to be consuming mealie rice and samp 4-7 times a week, respectively (Table 4.15).

Table 4.15: Frequency Consumption of Starch (n=362)

Frequency of food items per week	Porridge	Rice	Samp	Mealierice	Bread	Spaghetti	Oats	Cornflakes
1-3 times	28.8	63.3	45	11.3	34.5	40.8	36.4	26.8
4-7 times	58.8	19.1	6.6	2.5	58.5	17.5	12.5	20.8
Never	12.4	17.6	48.4	86.2	6.6	41.7	51.1	52.4

4.6.4 Dairy and Dairy Products Consumption

Table 4.16 shows that almost a quarter (18.8%) of the adolescent learners had consumed cheese 4-7 times in a week, while 18.5% had consumed milk 4-7 times a week. Both cheese and milk were the least consumed food items.

Table 4.16: Frequency Consumption of Milk and Dairy Products (n=362)

Frequency of food items per week	Milk	Yoghurt	Cheese
1-3 times	30.1	33.4	26
4 – 7 times	18.5	18.5	18.8
Never	27.4	48.1	55.2

4.6.5 Protein Foods Consumption

Table 4.17 shows that chicken and eggs were the most consumed protein products, with 43.9% of adolescents consuming chicken 1-3 times per week, while goat and mutton were the least consumed meat products.

Table 4.17: Frequency Consumption of Meat and Meat Alternatives (n=362)

Frequency of food items per week	Beef	Mutton	Chicken	Goat	Chicken necks	Eggs
1-3 times	29.6	13.5	43.9	6.4	41.2	41.2
4 – 7 times	12.4	3.9	40.3	1.9	29	29
Never	58.0	82.6	15.8	88.1	29.8	29.8

4.6.6 Legumes and Peanuts Consumption

Table 4.18 shows that majority (82.6%) of the adolescent learners indicated that they did not eat lentils in the past week. The most consumed legume product was beans as most adolescent learners eat beans 1-3 times a week (36.7%).

Table 4.18: Frequency of Legumes and Peanuts (n=362)

Frequency of food items per week	Beans	Peas	Lentils	Peanuts
1-3 times	36.7	12.7	11.8	27.4
4 – 7 times	9.2	5.8	5.6	9.6
Never	54.1	81.5	82.6	63.0

4.6.7 Soft Drinks Consumption

Table 4.19 shows that more than one quarter (38.7%) of the adolescent learners were consuming soft drinks 4-7 times per week and 22.9% of the adolescent learners were drinking fruit juice 4-7 times a week.

Table 4.19 Frequency Consumption of Beverages (n=362)

Frequency of food items per week	Fruit juice	Artificial juice	Soft drinks	Tea	Cremora	Sugar
1-3 times	31.8	21.8	44.7	42.8	36.4	41.6
4-7 times	22.9	16.9	38.7	40.3	27.4	44.2
Never	45.3	61.3	16.6	16.9	36.2	14.2

4.6.8 Bread Spread Consumption

Table 4.20 shows that margarine was the most used bread spread with 23.8% who reported that they used margarine 4–7 times a day, as compared to 11.6% and 18.8% of participants who reported to be using jam and peanut butter 4–7 times respectively.

Table 4.20: Frequency Consumption of Bread Spread (n=362)

Frequency of food items per week	Margarine	Jam	Peanut butter
1-3 times	34	22.7	27.1
4 – 7 times	23.8	11.6	18.8
Never	42.2	65.7	54.1

4.6.9 Processed Meat Consumption

Table 4.21 shows that almost half (24.3%) of the adolescent learners had eaten polony 4-7 times a week, and 20.4% were consuming polony 4-7 times a week.

Table 4.21: Frequency Consumption of Processed Meat (n=362)

Frequency of food items per week	Russian	Polony	Vianna
1-3 times	37.3	46.7	42.8
4 – 7 times	14.4	24.3	20.4
Never	48.3	29	36.8

4.6.10 Miscellaneous Consumption

Table 4.22 shows that sweets and simbas were the most consumed as 43.4% of adolescents were consuming sweets 4-7 times per week, while pies and cakes were the least consumed.

Table 4.22: Frequency Consumption of Miscellaneous (n=362)

Frequency of food items per week	Sweets	Simba	Niknaks	Ice cream	Achaar	Cakes	Vetkoek	Biscuits	Pies	Potato chips
1-3 times	39.5	36.5	33.7	28.5	37.5	34.5	33.2	41.7	18.8	46.7
4-7 times	43.4	43.3	33.7	14.1	20.5	7.8	16	19.9	6.4	17.9
Never	17.1	20.2	32.6	57.4	42.0	57.7	50.8	38.4	74.8	35.4

4.7 Relationship between Nutrition Knowledge and Dietary Practices

The study determined the relationship between nutrition knowledge and dietary practices based on the knowledge test statements.

Table 4.23 shows that less than a quarter (11.6%) of learners indicated in the knowledge questionnaire that five or more fruits and vegetables should be eaten a day, while only 8.01% reported to be eating fruits and vegetables, seven times a week.

Table 4.23: Relationship between the Number of Fruits and Vegetables that should be Eaten Per Week and the Frequency of Fruits and Vegetables that were Eaten Per Week

Frequency of fruits and vegetables that were eaten per week	**Knowledge on the number of fruits and vegetables that should be eaten per week**						**Statistical analysis**
	1 fruit and vegetable per day	3-4 fruit and vegetable per day	5 or more fruits and vegetables per day	There is no need to eat fruit and vegetable	**Total**	**%**	
0 time	31	29	7	0	67	18.51	P Value> 0.789
1 time	33	28	8	0	69	19.06	
2 times	34	28	8	0	70	19.34	
3 times	27	25	8	1	61	16.85	
4 times	11	23	7	0	41	11.33	
5 times	13	6	2	0	21	5.80	
6 times	2	2	0	0	4	1.10	
7 times	11	16	2	0	29	8.01	
Total	162	157	42	1	362	100	
%	44.75	43.37	11.60	0.28	100.00		

Table 4.24 shows that the majority of learners (85.9%) indicated that it is not healthy to snack on foods that contain a lot of sugar, while 23.76% reported to be eating sugar and foods that contain sugar, seven times a week.

Table 4.24: Relationship between It is Healthy to Snack on Foods that Contain a Lot of Sugar and the Frequency that Sugar and Foods that are Rich in Sugar were Eaten Per Week

Frequency of sugar and foods that contain sugar eaten per week	**The knowledge that it is healthy to snack on foods that contain a lot of sugar**				**Statistical analysis**
	True	False	**Total**	**%**	
0 times	13	49	62	17,13	P Value= 0.434
1 time	11	47	58	16.02	
2 times	4	39	43	11.88	
3 times	4	38	42	11.60	
4 times	2	27	29	8.01	
5 times	5	25	30	8.29	
6 times	1	11	12	3.31	
7 times	11	75	86	23.76	
Total	51	311	362	100	
%	14.09	85.91	100		

Table 4.25 shows that almost three quarters (72.65%) of learners answered that it is true that dry beans, peas, and lentils are healthy choice to eat in place of meat, whereas, only 2.7% reported to be eating legumes seven times per week.

Table 4.25: Relationship between "Dry Beans, Peas and Lentils are Healthy Choice to Eat in Place of Meat" and the Frequency that Meat and Meat Substitutes were Eaten Per Week

Frequency of legumes was eaten per week	Knowledge on that dry beans, peas, and lentils are healthy choice to eat in place of meat				Statistical analysis
	True	False	**Total**	**%**	
0 times	149	47	196	54,14	P Value= 0.496
1 time	33	19	52	14,36	
2 times	35	18	53	14,64	
3 times	22	6	28	7,73	
4 times	13	3	16	4,42	
5 times	3	2	5	1,38	
6 times	1	1	2	0,55	
7 times	7	3	10	2,76	
Total	263	99	362	100,00	
%	72.65	27.35	100		

Table 4.26 shows that majority (57.46%) of learners answered that milk and yoghurt contain too much calcium, while 15,75% reported consuming milk and milk products seven times per week.

Table 4.26: Relationship between which Foods Contain Too Much Calcium and the Number of Times that Milk and Milk Products were Eaten Per Week

Frequency of Milk and milk products that were eaten per week	Knowledge on which foods contain too much calcium						Statistical analysis
	Chicken and eggs	Milk and yoghurt	Pilchards	1 and 3	Total	%	
0 times	15	60	11	13	99	27,35	P Value= 0.880
1 times	10	33	8	9	60	16,57	
2 times	6	22	4	8	40	11,05	
3 times	12	30	6	6	54	14,92	
4 times	5	16	2	5	28	7,73	
5 times	3	9	0	0	12	3,31	
6 times	2	6	1	3	12	3,31	
7 times	7	32	6	12	57	15,75	
Total	60	208	38	56	362	100,00	
%	16.57	57.46	10.50	15.47	100		

Table 4.27 shows that more than a quarter (26.24%) of learners answered that you should not eat as much meat as you want. Correspondingly, 9.2% reported being eating meat and meat substitutes seven times per week.

Table 4.27: Relationship between "You Can Eat as Much Meat as You Want" and the Frequency of Meat and Meat Substitutes that were Eaten Per Week

Frequency of meat and meat substitutes that were eaten per week	Knowledge on that you should eat as much meat as much as you want				Statistical analysis
	True	False	**Total**	**%**	
0 times	28	80	108	29.83	P Value= 0.547
1 time	15	50	65	17.96	
2 times	9	37	46	12.71	
3 times	14	24	38	10.50	

4 times	12	28	40	11.05	
5 times	4	14	18	4.97	
6 times	2	12	14	3.87	
7 times	11	22	33	9.12	
Total	95	267	362	100	
%	26.24	73.76	100		

CHAPTER FIVE DISCUSSION OF THE RESULTS

5.1 Introduction

The study aimed to determine the nutrition knowledge and dietary practices of adolescent learners in the Polokwane Municipality, Limpopo Province, South Africa. In this chapter, the results of the study are discussed in relation to known literature.

5.2 Socio-Demographic Information

In the present study, 59.1% of the adolescent learners were females, and 40.9% were males. Similarly, in the research done in South Africa by Silangwe (2012), 56.7% of the adolescent learners were females, and 43,3% were males. On the other hand, Webb and Beckford (2014) reported lower percentages of adolescent females (45.5%) and higher percentages of adolescent males (55.5%) in Trinidad and Tobago. More female learners returned their forms as compared to male learners. It is also highly known that females are more than males. However, in a study done by Statistics South Africa (2018), males aged 10-19 years were 18.9%, while females comprised 18.1%. This showed that there were more males than females.

In the present study, more than half (51.9%) of adolescent learners were aged between 17-18 years old. On the other hand, in an earlier study done in South Africa, where it was found that 77% of adolescent learners in the study were aged between 17-18 years (Letlape, 2010). Alam *et al.,* (2010) reported a much lower percentage (18.3%) of adolescent learners aged 17-18 years in rural Bangladesh. The age of the adolescent in this present study was dependent on the grade, as many learners were in Grade 11. The age group gives the study an advantage as adolescent learners were able to answer the questionnaire and recall the food consumed.

Limpopo Province is 80% rural and % urban (Statistics South Africa, 2011). These statistics are supported by the present study, as 72.9% of learners were residing in a rural setting. The results differ from the survey conducted by Lošić and

Kenjerić (2015) who reported a much lower percentage (15.2%) of adolescent learners who were staying in the rural areas of Bosnia and Herzegovina. Although Polokwane Municipality is the economic hub of Limpopo Province, most of the population still reside in rural areas.

It is a known fact that water is essential to life (Benelam & Wyness, 2010). Access to water is one of the fundamental human rights as specified in the South African constitution, section 27(1). Approximately 88% of the South African population has access to basic water service (Oelofse & Strydom, 2010). In the present study, almost all adolescent learners (98.3%) had access to water. 1.1 billion people in the developing world reported having no access to safe water, which explains why the hygiene-related disease is so high in the developing world (Mengistie, Berhane & Worku, 2011).

About 80.7 % of the adolescent had access to electricity, which was used as the main source of fuel for cooking. Similarly, a study done in Lindelani, Kwazulu-natal Province, South Africa showed that 91.1% of the households of adolescent learners were using electricity as the primary source of cooking fuel (Silangwe, 2012). This supported the report by Statistics South Africa (2016a), which reported that 87,3%-95.3% of the Polokwane Municipality households have access to electricity. Access to electricity could be a positive attribute to the learners as they will have more time for learning and food preparation.

Worldwide, mothers are responsible for food preparation and as a primary caregiver in most households. More than (56.1%) of adolescent learners reported that their mothers were responsible for food preparation at home. The results of the present study are slightly higher than the results reported by Silangwe (2012), who indicated that 43.3 % of the mothers were responsible for food preparation in Lindelani, Kwazulu-Natal Province, South Africa. Similar findings were also reported in India were 51.7% of students indicated that their mothers were responsible for food preparation at home (Sireesha & Bindu, 2017). Mothers do food preparation as most assume the responsibility of a career and, secondly, more fathers are formally employed than mothers.

In the present study, about 39.5% of females were unemployed as compared to 24.9% of unemployed males.

5.3 Nutrition Knowledge of Adolescent Learners

Nutrition education forms part of the natural sciences and life orientation curriculum from Grade 4 to Grade 9, which means, that all learners had lessons that cover nutrition education (Department o f Basic Education, 2011; Department of Basic Education, 2013). The majority (79.0%) of adolescent learners in the present study indicated that they were taught about nutrition. On the other hand, Buxton (2014) in Ghana reported that 97.1% of adolescent learners were taught about nutrition. The results of the present study show that most learners receive nutrition education lessons. This results will help to improve the nutrition knowledge of adolescent learners. The concern is the indication of 21% of participants who did not mention being taught nutrition lessons.

In the present study, the main source of nutrition information of adolescent learners were teachers (50,3%), followed by television (21.6%). The result is a good indication of the impact of nutrition lessons offered by the Department of Basic Education. Similarly, Kinyua (2014) reported that 57.9% of adolescent learners in Kenya had used the school as the main source of nutrition information. On the contrary, in the study done in the United States of America by Thielemann (2012), only 46.7% of the college students indicated that their main source of nutrition information was the school, followed by family (24.0%). School curriculum is an important element to increase nutrition knowledge.

The majority of adolescent learners (61.6%) reported having adequate nutrition knowledge. The previous studies done in Tswaing High School, South Africa, and Sokoto Metropolis, Nigeria had shown a much lower percentage of learners who had adequate nutrition knowledge when compared with the current study (Letlape, 2010; and Essien *et al.*, 2014). The difference in these results are due to the nutrition knowledge scale used to determine the level of nutrition knowledge and also different questions that have been included in the nutrition knowledge test. In the present study, 7 level knowledge designed by the department of education scale was used. Contrary to the scale used by Essien *et al.* (2014) and Letlape (2010) who used the 5 level

knowledge developed by Whati (2005).

It is recommended that females and males aged 14 years and older should consume an average of 2 litres and 2.5 litres of water per day respectively, (EFSA Panel on Dietetic Products Nutrition and Allergies NDA, 2010). Almost half (47.5%) of the adolescent learners in the present study knew that an amount of 7 to 9 glasses of water should be drinking per day. On the other hand, Sireesha and Bindu (2017) reported that 60.5% of adolescent learners in India knew that they should drink at least 8 glasses or 2 litres of water per day. There is a need to educate learners on the recommended amount of water. The present study tested only knowledge, not on the actual amount of water drank by the learners.

According to SAFBDG, plenty of fruits and vegetables should be consumed every day (Vorster, Badham & Venter, 2013). The recommended intake is 400 g of vegetables and fruit per day, the equivalent of five servings of 80g each (WHO & FAO, 2003). It can be translated into two fruits and three vegetables or two vegetables and three fruits daily. The present study reported that 11.6 % knew that5-6 fruits and vegetables are required per day. The results in the current study are comparable with the results of the study done earlier in Tswaing High School was less than 20% of learners knew the correct number of servings of vegetables and fruits (Letlape, 2010). Although nutrition knowledge cannot guarantee adequate intake, it is a prerequisite for good dietary practices. Low consumption of fruit and vegetables is related to several chronic diseases during adulthood, such as ischaemic heart disease and stroke (Kerkadi, 2003). Often Low consumption of fruit and vegetables in developed countries is caused by an unhealthy diet and lack of knowledge whereas, in developing countries, poverty and food security are the leading causes (Food and Agriculture Organization of the United Nations, 2015).

Starchy foods should form the basis of most meals (Vorster, Badham & Venter, 2013). Only 25.1% of the adolescent learners in this study had knowledge that food groups such as bread, samp, rice, porridge should form the basis of most meals. On the other hand, Letlape (2010) indicated that 44% of the adolescent learners at Tswaing High School in Winterveldt knew that food groups such as bread, samp, rice, porridge should form the basis of most meals. The results in the current study, as well as a result presented by Letlape (2010), revealed that less than 50% of learners in South Africa knew that starchy foods should form the basis of most meals.

The SAFBDG recommends that people should enjoy a variety of foods (Vorster, Badham & Venter, 2013). In the present study, 18.5% of the adolescent learners knew that a healthy way of eating is by eating many different kinds of foods. Similarly, studies reported that 12.3% of Tswaing High School learners, Pretoria and 19.5% of Afhad university students in Sudan knew that a healthy way of eating is by eating many different kinds of foods (Letlape, 2010; and Elhassan, Gamal & Mohammed, 2013). These studies indicate that adolescents still do not know that eating a variety of food is a healthy way of eating. The exposes a need for adolescents to be taught the first guideline of the SAFBDG.

Vegetables and fruits are good sources of micronutrients and dietary fibre (Agudo, 2005). In the present study, more than half of adolescent learners (50.8%) knew that fruits and vegetables are good sources of fibre and Vitamin A. The results of the present study are slightly higher than the results reported in India and Ghana which showed that 44.5% and 43.3% of adolescent knew that vegetables and fruits are good sources of vitamins and minerals respectively (Sireesha & Bindu*,* 2017*;* and Essien *et al*., 2014). There is still inadequate knowledge among adolescents on the benefit of fruits and vegetables.

Milk and dairy products are rich sources of calcium (Nicklas, 2003). In the present study, about 57.5% of adolescent learners knew that milk and yoghurt are a rich source of calcium. The current study reported a higher level of nutrition knowledge on the value of milk as compared to the study conducted in Tswaing High School, South Africa, which reported a low level of 15%. On the other hand, Elhassan *et al.* (2013) indicated that 33.4% of Afhad university students in Sudan knew which foods have more calcium. An insufficient calcium intake leads to weak bones, which eventually increases the risk of uncontrolled heartbeat, cramps, bone fractures and osteoporosis in adulthood (Nicklas, 2003). The value of milk in being the rich source of calcium has led to the inclusion of the guideline “have milk, maas or yoghurt every day” in the revised SAFBDG (Vorster, Badham & Venter, 2013)

5.4 Dietary Practices

Breakfast intake has been linked to decreased risk for obesity and cardiovascular disease, improved cognition, improved nutrient intake and has been shown to have behavioural and psychological importance (Deshmukh-Taskar *et al.,*2010). Almost three-quarters of adolescent learners indicated that they were eating breakfast before going to school (74.0%). When comparing this figure to the recent national survey, most children (68.4%) in South Africa eat breakfast before going to school (SANHANES, 2013). When examined by province, Limpopo reported a lower number of children (52.5%) who ate breakfast as compared to the other eight provinces; nevertheless, the results can still be considered moderate (Shisana *et al*., 2013). On the other hand, internationally, the results differ depending on the dietary practices and availability of resources. Buxton (2014) reported that 37.2% of adolescent learners in Ghana had indicated they were eating breakfast before going to school, while 44.1% of adolescents ate breakfast in Bahrain (Musaiger *et al.*,2011). The most common reasons for skipping breakfast were, namely: 1) not being hungry in the morning, 2) not having enough food in the house, 3) people in the house do not have breakfast, 4) cannot wake up early enough, and 4) cannot make their own breakfast (Shisana *et al.,* 2013).

Most adolescent learners (58.6%) indicated that they had lunch which is mostly eaten at school. A similar observation was made by Buxton (2014) in Ghana where 59.8% of adolescent learners had eaten lunch in the past week. On the other hand, Musaiger *et al.* (2011) reported a higher percentage (83.3%) of adolescent learners who ate lunch in Bahrain. The most common reasons for not eating lunch were not liking the food or not being hungry (Hoppu *et al.*, 2010)**.**

It is imperative for an adolescent to consume all three meals a day, which include breakfast, lunch, and supper. In the present study, 66.9% of adolescent learners consumed supper in the past week. Similarly, the study done in Ghana indicated that 64.9% of adolescent learners had eaten supper in the past week (Buxton, 2014). On the contrary, Musaiger *et al.* (2011) reported that 73.6% of adolescent learners who had eaten supper in Bahrain. A high intake of supper could be due to the fact

that many families eat supper together, as it is assumed that most family members are back from school or work.

About 26.2% of adolescent learners in the present study had eaten three meals per day. Similarly, Silangwe (2012) reported that 24.8% of adolescent learners in Lindelani, Kwazulu-Natal Province, South Africa had eaten three meals per day. On the other hand, a higher percentage of 37.2% and 38.5% of adolescent learners had eaten three meals per day in Ghana and Bosnia and Herzegovina respectively (Buxton, 2014; and Lošić & Kenjerić, 2015). The results show that adolescents are eating below the recommended number of meals a day. In the present study, 33.4% had two meals a day, while 31.5 % had one meal a day.

More than one-third (35.25%) of adolescent learners had indicated that they had consumed soft drinks one to three times a week. On the other hand, a study done by Lošić and Kenjerić (2015) in Bosnia and Herzegovina indicated that 11.8% of adolescent learners had consumed fizzy drinks beverages two to three times a week. On the contrary, a lower percentage of 17.7% was reported by Musaiger *et al.* (2011), who indicated that adolescent learners in Bahrain had drunk soft drinks one to three times a week. Too much consumption of soft drinks may cause bone fractures during adulthood. Students with more money are likely to purchase more soft drinks than once without money (Scully *et al.*, 2017).

SAFBDG recommends that starchy foods should form part of most meals (Vorster, Badham & Venter, 2013). The stable starchy food in the present study is porridge. More than half (58.8%) of adolescent learners in the present study had consumed porridge 4-7 times a week. The study did not probe further in terms of the refinement and the amount of fibre of the starchy foods. Similarly, Nabhani-Zeidan, Naja and Nasreddine (2011) in Lebanon, indicated that the low-SES group had considerably higher (58.61%) intake of carbohydrate foods are part of stable foods in most countries which explains the high intake.

According to SAFBDG, sugar and food and drinks high in sugar should be used sparingly (Vorster, Badham & Venter, 2013). In the present study, 38.7% of the adolescent learners had consumed soft drinks 4-7 times per week. Contrarily, Musaiger *et al*., (2011) reported a lower percentage of adolescent learners (12.4%) in Bahrain had consumed soft drinks 4-6 times a week. A high intake of refined sugars is one of the causes linked to overweight and obesity amongst adolescents.

SAFBDG recommends that fish, chicken, lean meat and eggs should be eaten daily (Vorster, Badham & Venter, 2013). In the present study, 43.9% of adolescent learners had eaten chicken 1-3 times a week; about 40.3% had eaten chicken 4-7 times a week. Similarly, Musaiger *et al.* (2011) reported that 41.5% of adolescent learners in Bahrain had consumed chicken 1-3 times a week. On the other hand, Lošić and Kenjerić (2015) reported a lower percentage (35.3%) of adolescent learners in Bosnia and Herzegovina who had consumed meat 2-3 times in a week. Chicken is less expensive in South Africa, and that is why it is the most consumed meat as compared to other meats.

According to SAFBDG, milk, maas, or yoghurt should be consumed every day (Vorster, Badham & Venter, 2013). In the present study,18.5% of adolescent learners had consumed milk 4-7 times per week. Similarly, Alam *et al.* (2010) indicated that 12.9% of adolescent girls in Bangladesh had consumed milk 4-7 times a week. In another study done by Musaiger *et al.* (2011) in Bahrain, 13.6% of adolescent learners had consumed milk 4-6 times a week. Milk is expensive, and most people cannot afford to buy it, which explains the inadequate intake.

SAFBDG recommends that dry beans, split peas, lentils, and soya, should be consumed regularly (Vorster, Badham & Venter, 2013). In the present study, majority (82.6%) of the adolescent learners had not consumed lentils in the past week. Similarly, in a study done by Musaiger *et al.* (2011) in Bahrain, 62.4% of adolescents indicated that they had barely consumed lentils or beans in the past week. On the other hand, in the study done by Alam *et al.* (2010) in rural Bangladesh, 25.3% of adolescent girls indicated that they had not consumed lentils

in the past week. The low intake of legumes is a concern considering the value of legumes in reducing obesity, type 2 diabetes, CVD and cancer.

In the present study, more than a quarter (26.2%) of the adolescent learners had consumed apples 4-7 times in the past week. Similarly, Lošić and Kenjerić (2015) indicated that 22.7% of the adolescent in Bosnia and Herzegovina had consumed fruit once in a day. On the contrary, Musaiger *et al*. (2011) reported a lower percentage (14.6%) of adolescent learners who had consumed fruits 4-6 times a week. Poor intake of fruits could be due to affordability in the developing countries and lack of knowledge in the developed countries.

In the present study,11.4% of the adolescent learners had consumed cabbage 4-7 times in the past week. Similary, Musaiger *et al.* (2011) in Bahrain reported that 9.5% of the adolescent learners had consumed vegetables 4-6 times in a week. On the contrary, Lošić and Kenjerić (2015) reported a higher percentage (39.5%) of the adolescent in Bosnia and Herzegovina who had consumed vegetables once in a day. Inadequate intake of vegetables in South Africa and Bahrain could be because their parents do not purchase vegetables or there is a lack of financial means to access vegetables.

5.5 Relationship between Nutrition Knowledge and Dietary Practice

Even though 11.6% of adolescent learners got the correct answers that five or more fruits and vegetables should be consumed each day, only 8.01 % of adolescent learners had eaten fruits and vegetables seven times a week. On the other hand, Grosso *et al.* (2013) in Italy indicated that higher nutrition knowledge score was linked with higher consumption of fruits and vegetables. Similarly, in another study done by Kristjansdottir *et al.* (2006) among 11-year-olds in Iceland, fruit and vegetable knowledge had a positive effect on their intake. Nutrition knowledge amongst the adolescent in South Africa did not translate to good dietary practice while nutrition knowledge was translated to good dietary practices in the studies done by Grosso *et al.* (2010) and Kristjansdottir *et al.* (2006). The possible reasons could be due to the fact that Italy and Iceland are more developed than South Africa and in return, the adolescents can be able to put their knowledge into practice by being able to afford to buy healthy foods.

The majority (85.9%) of adolescent learners in the present study indicated that you could not be healthy if you snack on foods that contain a lot of sugar. Only 23.76% reported that they had eaten sugar and sugary foods, seven times a week. Similarly, Grosso *et al.* (2013) in Italy, indicated that a higher nutrition knowledge score was considerably linked with lower intake of sugary drinks. The results of these studies suggest that nutrition knowledge may not translate to good dietary practices.

More than a quarter (26.24%) of adolescent learners in the present study indicated that you should eat as much meat as you want. Only 9.2% indicated that they had eaten meat and meat substitutes seven times per week. The intake in the consumption of meat versus nutrition knowledge is due to affordability. The learners who responded that you should eat as much meat as you want may not have the financial means to do so. On the other hand, in a study done by Grosso *et al*. (2013) in Italy, a higher quartile nutrition knowledge score was associated with a higher intake of meat. In South Africa, Oldewage-Theron *et al*. (2014) reported that higher nutrition knowledge score was associated with higher protein intake.

More than a half (57.46%) of adolescent learners in the present study knew that milk and yoghurt contain too much calcium, while 15,75% reported being consuming milk and milk products seven times per week. On the other hand, Elhassan *et al.* (2013) indicated that 33.4% of Afhad university students in Sudan knew which foods have more calcium, while 44.9% of the Afghan University students stated that they had consumed milk daily. Nutrition knowledge of the adolescent learners in the present study did not translate to good dietary practice while in the study done by Ehassan *et al.* (2013), nutrition knowledge was translated to good dietary practice.

Almost three quarters (72.65%) of adolescent learners in the present study answered that it is true that dry beans, peas, and lentils are healthy choice to eat in place of meat whereas, only 2.7% reported to be eating legumes seven times per week. In a study done by Alam *et al*. (2010) in rural Bangladesh, 21% knew that lentils were high in protein, while 12.7% reported being eating lentils 6-7 times in a week. In a study done by Asakura, Todoriki and Sasaki (2017) in Japan, girls who were in higher grade with higher nutrition knowledge had consumed more soybeans soy products. A possible reason for the poor intake of legumes could be due to taste. Legumes are affordable,

and cost may not be the reason for low consumption.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter outlines the conclusions drawn and recommendations made based on the findings of the study. Factors that placed limitations on the research study have been identified and described in this chapter.

6.2 Conclusion

The study aimed to determine the nutrition knowledge and dietary practices of adolescent learners in the Polokwane Municipality. The researcher first determined the socio-demographic status of adolescent learners. Data revealed that females respondent were more than males. The predominant age group in the study were aged 17 to 18 years old. And the dominant grades were 10 and 11.

The first objective was to determine the nutrition knowledge of adolescent learners. The results showed that adolescent learners had adequate nutrition knowledge, while had poor nutrition knowledge. The most common nutrition knowledge questions that adolescent learners had knowledge on are it is not healthy to snack on foods that contain a lot of sugar, the body needs a little bit of salt to be healthy as well as that sugar and foods that contain sugar should be eaten in small amounts.

The second objective was to determine the dietary practices of adolescent learners. In the present study, almost three-quarters had indicated that they were eating breakfast before going to school (74. 0%). The most common poor dietary practices reported by adolescent learners were the following: 38.7% was consuming soft drinks 4-7 times in a week, and 82.6% did not eat lentils in a week.

The third objective was to determine the relationship between nutrition knowledge and dietary practices of adolescent learners. The findings showed that there was no relationship between nutrition knowledge and dietary practices. Only 11.6% of learners indicated in the knowledge questionnaire that they were eating five or more fruits and vegetables a day, while only 8.01% reported to be eating fruits and vegetables, seven times a week. Almost three quarters (72.65%) of adolescent learners answered that it

is true that dry beans, peas, and lentils are healthy choice to eat in place of meat, whereas only 2.7% reported to be eating legumes seven times per week.

The finding also showed that there was a relationship between nutrition knowledge and dietary practice. More than a quarter (26.24%) of learners answered that you should not eat as much meat as you want, while correspondingly only 9.2% reported to be eating meat and meat substitutes seven times per week.

6.3 Limitation of the Study

Nutrition knowledge and dietary practices of adolescent learners were only limited to South African FBDGs and also from the study titled: development of a reliable and valid nutritional knowledge questionnaire for urban South African adolescents (Whati, 2005). Only FFQ was used to assess the dietary practices of adolescent learners; the use of other methods could have enhanced the results of the study. The study recorded the frequency and did not include the quantity of food consumed. The study also did not probe the association of demographic factors on nutrition knowledge and dietary practices since those factors can have a negative impact on nutrition knowledge and dietary practices.

6.4 Recommendations

The following recommendations are made based on the findings and limitations of this study.

Since most of the adolescent learners had adequate nutrition knowledge but poor dietary practices, therefore nutrition education should be extended to family members, especially mothers as they are the primary caregivers and mostly responsible for cooking food.

Most of the adolescent learners had poor dietary practices, and the possible reasons for that could be due to affordability. In order to improve their dietary practices, emphasis should be placed on establishing and maintaining household vegetable gardens in the community as these can contribute not only the dietary quality of the diet but also to alleviating the food security.

Although most of adolescents learners seem to have adequate nutrition knowledge, more still need to be done to increase their understanding especially on the importance Food-Based Dietary Guidelines of South Africa and its practical implementation in daily life situation.

The findings of this study can serve as baseline information on future studies. Future studies should focus on possible reasons that may lead to poor dietary practices and also on the number of ways in which dietary practices can be improved.

REFERENCES

Agudo, A. (2005) *Measuring intake of Fruit and Vegetables*. Spain:Joint FAO/WHO.

Alam, N., Roy, S.K., Ahmed, T., & Ahmed, A.M.S. (2010). 'Nutritional Status, Dietary Intake and Relevant Knowledge of Adolescent Girls in Rural Bangladesh', *Journal of Health, Population and Nutrition*, 28(1), pp. 86–94. doi: 10.3329/jhpn.v28i1.45 27.

Amine, E., Baba, N., Belhadj, M., Deurenbery-Yap, M., Djazayery, A., Forrester, T., Galuska, D., Herman, S., James, W., M`Buyamba, J., Katan, M., Key, T., Kumanyika, S., Mann, J., Moynihan, P., Musaiger, A., Prentice, A., Reddy, K., Schatzkin, A., Seidell, J., Simpopoulos, A., Srianujata, S., Steyn, N., Swinburn, B., Uauy, R., Wahlqvist, M., Zhao-su, W., & Yoshiike, N. (2003). *Introduction*, *Diet, Nutrition and the Prevention of Chronic Diseases:* Geneva: Joint WHO/FAO Expert Consultation. Available at: http://dro.deakin.edu.au/view/DU:30010488 (Accessed: 22 July 2019).

Amos, P.M., Intiful, F.D., & Boateng, L. (2012). 'Factors that were Found to Influence Ghanaian Adolescents' Eating Habits', *SAGE Open,* 2(4), pp. 1–6. doi: 10.1177/2158244012468140.

Arora, G. (2016). 'Impact of Nutrition Education on Knowledge, Attitude, Practices and Beliefs of Adolescent Girls Belonging to Rural and Urban Area of District Kurukshetra', *International Journal of Nutrition and Food Sciences*, 5(4), pp. 278-283. doi: 10.11648/j.ijnfs.20160504.17.

Asakura, K., Todoriki, H., & Sasaki, S. (2017). 'Relationship between Nutrition Knowledge and Dietary Intake among Primary School Children in Japan: Combined effect of children's and their guardians' knowledge', *Journal of Epidemiology*., 27(10), pp. 483–491. doi: 10.1016/j.je.2016.09.014.

Buxton, C.N.A. (2014). 'Ghanaian Junior High School Adolescents Dietary Practices and Food Preferences: Implications for Public Health Concern', *Journal of Nutrition and Food Sciences*, 04(05), p. 9. doi: 10.4172/2155-9600.1000297.

Banna, J.C., Buchthal, O.V., Delormier, T., Creed-Kanashiro, H.M., & Penny, M.E. (2016). 'Influences on Eating: A qualitative study of adolescents in a periurban area in Lima, Peru', *BMC Public Health*,16(1), pp. 1–11. doi: 10.1186/s12889-016-2724-7.

Bano, R., Alshammari, E., Syeda, F.B., & Norah, A. (2013). 'A Comparative Study of Knowledge, Attitude, Practice of Nutrition and Non-Nutrition Student towards a Balanced Diet in Hail University', *IOSR Journal of Nursing and Health Science*, 2(3), pp. 29–36. Available at: www.iosrjournals.orgwww.iosrjournals.org.

Bargiota, A., Delizona, M., Tsitouras, A., & Koukoulis, G.N.(2013). 'Eating Habits and Factors Affecting Food Choice of Adolescents Living in Rural Areas', *Hormones*, 12(2), pp. 246–253. doi: 10.14310/horm.2002.1408.

Barooah, P. (2012). 'Adolescents' Nutrition, Attitudes and Practices', *Basic, Applied & Social Sciences*, 2, pp. 308–311.

Benelam, B., & Wyness, L. (2010). 'Hydration and Health: A review', *Nutrition Bulletin*, 35(1), pp. 3–25. doi: 10.1111/j.1467-3010.2009.01795.x.

Bere, E., Sørli Glomnes, E., Te Velde, S.J., & Klepp, K.I. (2008). 'Determinants of Adolescents' Soft Drink Consumption', *Public Health Nutrition*, 11(1), pp. 49–56.

doi: 10.1017/S1368980007000122.
Butterfield, S. (2015). 'Adolescent Growth and Development with Implications for Youth Sports Coaches', *International Journal of School and Cognitive Psychology*, 2(3), pp. 2–4. doi: 10.4172/2469-9837.1000135.
Buttriss, J.L. (2011). 'Translating Complex Science into Life-Course Health Promoting Strategies', *Proceedings of the Nutrition Society*, 70(1), pp. 38–46. doi: 10.1017/S 0029665110004726.
Carraway-Stage, V., Hovland, J., Showers, C., Díaz, S., & Duffrin, M.W. (2015). 'Food-Based Science Curriculum Yields Gains in Nutrition Knowledge', *Journal of School Health*, 85(4), pp. 231–240. doi: 10.1111/josh.12243.
Center for Education Statistics. (2012). *Improving the Measurement of Socioeconomic Status for the National Assessment of Educational Progress*. United States of America: Center for Education Statistics. Available at: https://nes.ed.gov/nations reportcard/pdf/researchcenter/Socioeconomicfactors.pdf (Accessed: 29 July 2019).
Cummings, J.H., & Stephen, A.M. (2007). 'Carbohydrate Terminology and Classification', *European Journal of Clinical Nutrition*, 61, pp.5–18. doi: 10.1038/sj. ejcn.1602936.
Department of Basic Education. (2013). *National Curriculum Statement: Natural Science and Technology*. Cape Town: Department of Basic Education. Available at: http://www.education.gov.za (Accessed: 20 September 2019).
Department of Basic Education. (2011). *Basic Education, Curriculum and Assessment Policy Statement Grades 7-9 Life Orientation CAPS.* Cape Town: Department of Basic Education. Available at: http://www.education.gov.za (Accessed: 20 September 2019)
De Souza, R.J., Mente, A., Maroleanu, A., Cozma, A.I., Ha, V., Kishibe, T., Uleryk, E., Budylowski, P., Schünemann, H., Beyene, J., & Anand, S.S. (2015). 'Intake of Saturated and Trans Unsaturated Fatty Acids and Risk of All Cause Mortality, Cardiovascular Disease, and Type 2 Diabetes: Systematic review and meta-analysis of observational studies', *BMJ (Online)*, 351, pp. 1–16. doi: 10.1136/bmj.h3978.
Drewnowski, A., & Darmon, N. (2005). Symposium : Modifying the Food Environment : Energy Density, Food Costs, and Portion Size Food Choices and Diet Costs : an Economic Analysis , *The Journal of Nutrition,135, pp-900-904*
Driver, C. (2000). 'Fat facts', *New Scientist*, 166(2236), pp.1. doi: 10.1016/s0140-6736(06)68717-5.
Duthie, S.J., Duthie, G.G., Russell, W., Kyle, J.A.M., Macdiarmid, J.I., Rungapamestry, V., Stephen, S., Megias-Baeza, C., Kaniewska, J.J., Shaw, L., Milne, L., Bremner, D., Ross, K., Morrice, P., Pirie, L.P., Horgan, G., & Bestwick, C.S. (2018). 'Effect of Increasing Fruit and Vegetable Intake by Dietary Intervention on Nutritional Biomarkers and Attitudes to Dietary Change: A randomised trial', *European Journal of Nutrition*. Springer Berlin Heidelberg, 57(5), pp. 1855–1872. doi: 10.1007/s00394-017-1469-0.
EFSA Panel on Dietetic Products Nutrition and Allergies (NDA). (2010). 'Scientific Opinion on Dietary Reference Values for water | European Food Safety Authority', *EFSA Journal*, 8(3), pp.1- 48. doi: 10.2903/j.efsa.2010.1459.
Elhassan, M.R., Gamal, H.E., & Mohammed, G.S.S. (2013). 'Nutrition Knowledge Attitude and Practices Among Students of Ahfad University for Women.', *Indian Journal of Scientific Research*, 4(1), pp. 25–34.

Essien, E., Emebu, P.K., Iseh, K.R., & Haruna, M.J. (2014). 'Assessment of Nutritional Status and Knowledge of Students from Selected Secondary Schools in Sokoto Metropolis, Sokoto State, Nigeria', *African Journal of Food, Agriculture, Nutrition and Development*, 14(6), pp. 2254-2268.

Fahlman, M.M., Dake, J.A., McCaughtry, N., & Martin, J. (2008). 'A Pilot Study to Examine the Effects of a Nutrition Intervention on Nutrition Knowledge, Behaviors, And Efficacy Expectations In Middle School Children: Research article', *Journal of School Health*, 78(4), pp. 216–222. doi: 10.1111/j.1746-1561.2008.00289.x.

Food and Agriculture Organization of the United Nations. (2015). *Promotion of Fruit and Vegetables for Health*.Rome. Rome: Food and Agriculture Organization of the United Nations. Available at: http://www.fao.org (Accessed:15 October 2019).

Grosso, G., Mistretta, A., Turconi, G., Cena, H., Roggi, C., & Galvano, F. (2013). 'Nutrition Knowledge and Other Determinants of Food Intake and Lifestyle Habits in Children and Young Adolescents Living in a Rural Area of Sicily, South Italy', *Public Health Nutrition*, 16(10), pp.1827–1836. doi: 10.1017/S1368980012003965.

Hanson, M.D., & Chen, E. (2007). 'Socioeconomic Status and Health Behaviors in Adolescence: A review of the literature', *Journal of Behavioral Medicine*, 30(3), pp. 263–285. doi: 10.1007/s10865-007-9098-3.

Henningsen, M. (2011) *Dietary Habits in Adolescence Related to Sociodemographic Factors, Physical Activity and Self-Esteem.* Dissertation. Norwegian University Of Science And Technology.

Hoppu, U., Lehtisalo, J., Tapanainen, H., & Pietinen, P. (2010). 'Dietary Habits and Nutrient Intake of Finnish Adolescents.', *Public Health Nutrition*, 13(6), pp. 965–972. doi: 10.1017/S1368980010001175.

Hu, F.B. (2010a) 'Are Refined Carbohydrates Worse Than Saturated Fat? ', *American Journal of Clinical Nutrition*, 91, pp. 1541–1542. doi: 10.3945/ajcn.2010.29622.

Hu, F.B., & Malik, V.S. (2010b). 'Sugar-Sweetened Beverages and Risk of Obesity and Type 2 Diabetes: Epidemiologic evidence', *Physiology and Behavior*. Elsevier Inc., 100(1), pp. 47–54. doi: 10.1016/j.physbeh.

Hutchins, A.M., Winham, D.M., & Thompson, S.V. (2012). 'Phaseolus Beans: Impact on glycaemic response and chronic disease risk in human subjects', *British Journal of Nutrition*, 108 (1), pp, S52–S65. doi: 10.1017/S0007114512000761.

Kaczmarczyk, M.M., Miller, M.J., & Freund, G.G. (2012). 'The Health Benefits of Dietary Fiber: Beyond the usual suspects of type 2 diabetes mellitus, cardiovascular disease and colon cancer', *Metabolism: Clinical and Experimental*, 61(8), pp. 1058- 1066. doi: 10.1016/j.metabol.2012.01.017.

Kattelmann, K. (2014). 'What is Effective Nutrition Education?', *Journal of Nutrition Education and Behavior*. Society for Nutrition Education and Behavior, 46(6), pp.1. doi: 10.1016/j.jneb.2014.09.007.

Kearney, J. (2010). 'Food Consumption Trends and Drivers', *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365(1554), pp. 2793–2807. doi: 10.1098/rstb.2010.0149.

Kelishadi, R., & Azizi-Soleiman, F. (2014). 'Controlling Childhood Obesity: A systematic review on strategies and challenges Effective interventions for prevention and control of childhood obesity should be considered for different aspects', *Journal of Research in Medical Sciences*, 19, pp. 993–1008.

Kerkadi, A. (2003). 'Evaluation of Nutritional Status of United Arab Emirates University Female Students', *Emirates Journal of Agricultural Sciences*, 15(2), pp. 42–50.

Kinyua, L.W. (2013). *Association of Nutrition Knowledge and Attitude with Dietary Practices and Nutritional Status of Female Undergraduate Students Attending University Colleges within Nairobi Metropolis*. Dissertation. University of Nairobi.

Kostanjevec, S., Jerman, J., & Koch, V. (2013). 'Nutrition Knowledge in Relation to the Eating Behaviour and Attitudes of Slovenian Schoolchildren', *Nutrition and Food Science*, 43(6), pp. 564–572. doi: 10.1108/NFS-10-2012-0108.

Kovács, E., Hunsberger, M., Reisch, L., Gwozdz, W., Eiben, G., De Bourdeaudhuij, I., Russo, P., Veidebaum, T., Hadjigeorgiou, C., Sieri, S., Moreno, L.A., Pigeot, I., Ahrens, W., Pohlabeln, H., & Molnár, D. (2015). 'Adherence to Combined Lifestyle Factors and Their Contribution to Obesity in the IDEFICS Study', *Obesity Reviews*, 16(12), pp. 138–150. doi: 10.1111/obr.12349.

Kristjansdottir, A.G., Thorsdottir, I., Bourdeaudhuij, I., Due, P., Wind, M., & Klepp, K. (2006). 'Determinants of Fruit and Vegetable Intake among 11-Year-Old Schoolchildren in a Country of Traditionally Low Fruit and Vegetable Consumption', 9, pp. 1–9. doi: 10.1186/1479-Received.

Labadarios, D., Steyn, N.P., & Nel, J. (2011). 'How Diverse is the Diet of Adult South Africans?', *Nutrition Journal*, 10(1), pp. 1–11. doi: 10.1186/1475-2891-10-33. Leedy, P.D*.,* & Ormrod, J.E. (2010). *Practical Research, Planning and Design,* (9th ed). New jersey: Person Education Internal and Prentice.

Leedy, P.D., & Ormrod, J.E. (2005). *Practical Research, Planning and Design*. (8th ed). New Jersey: Person Education Internal and Prentice.

Leonard, T., Hughes, A.E., & Pruitt, S.L. (2017). 'Understanding How Low–Socioeconomic Status Households Cope with Health Shocks: An Analysis of Multisector Linked Data', *Annals of the American Academy of Political and Social Science*, 669(1), pp. 125–145. doi: 10.1177/0002716216680989.

Letlape, S. (2010). *Knowledge and Practice of Tswaing High School Learners regarding Diet, Nutrition and Exercise*. Dissertation. University of Limpopo (Medunsa Campus).

Levin, K.A. (2006). 'Study Design III: Cross-sectional studies', *Evidence-Based Dentistry*, 7(1), pp. 24–25. doi: 10.1038/sj.ebd.6400375.

Li, M., Dibley, M.J., Sibbrit, D.W., & Yan, H. (2010). 'Dietary Habits and Overweight/Obesity in Adolescents in Xi'an City, China', *Asia Pacific Journal of Clinical Nutrition*, 19(1), pp. 76–82.

Lock, K., Smith. R.D., Dangour, A.D., Keogh-Brown, M., Piggato, G., Hawkes, C., Fisberg, R.M, & Chalabi, Z. (2010). 'Health, Agricultural and Economic Effects of Adoption of Healthy Diet Recommendations', *The Lancet*, 376(9753), pp. 1699–1709. doi: 10.1016/S0140-6736(10)61352-9.

Lorasch-Gunderson, D. (2012). *Relative Influence of Family, Peers, and Media on the Development of Eating Disorders in Adolescents*. Dissertation.St Catherine University. Available at: http://sophia.stkate.edu/mswpapers/66 (Accessed:12 July 2018).

Lošić, D., & Kenjerić, C. D. (2015). 'Does Knowledge Influences Our Diet? Dietary Habits of Adolescents Enrolled in General Profile and Catering School Programme', *Hrana u zdravlju i bolesti: znanstveno-stručni časopis za nutricionizam i dijetetiku*, 4(2), pp. 98–104.

Luevorasirikul, K. (2007). *Body Image and Weight Management*.Disseratation. University of Nottingham. Available at: http://nottingham.ac.uk/csrhhc (Accessed:

15 June 2018)
Mallick, N., Ray, S., & Mukhopadhyay, S. (2014). 'Eating Behaviours and Body Weight Concerns among Adolescent Girls', *Advances in Public Health*, pp. 1–8. doi: 10.1155/2014/257396.
Malongane, F. (2009). *An Assessment of the Nutritional Status of Children on Primary School Nutrition Programme in Polokwane Municipality, Limpopo Province.* Dissertation. University of Venda.
Mesías, M., Seiquer, I., & Navarro, M.P. (2011). 'Calcium Nutrition in Adolescence', *Critical Reviews in Food Science and Nutrition* ,51(3), pp.195-209.doi: 10.1080/10408390903502872.
Moreno, L.A., Rodriquez,G., Fleta, J., Bueno-Lozano, M., Lazaro, A., & Bueno,G. (2010). 'Trends of dietary habits in adolescents', *Critical Reviews in Food Science and Nutrition*, 50(2), pp. 106–112. doi: 10.1080/10408390903467480.
Moeng, L., & De-Hoop, M. (2008). 'Government Community Nutrition Programmes and Strategies', In Steyn, N.P., & Temple, N. (Eds.) *Community Nutrition Textbook for South Africa: A rights-based approach*. South Africa: MRC and FAO, pp. 287.
Musaiger, A.O., Bader, Z., Al-Roomi, K., & D'Souza, R. (2011). 'Dietary and Lifestyle Habits amongst Adolescents in Bahrain', *Food and Nutrition Research*, 55(7122), pp. 1–8. doi: 10.3402/fnr.v55i0.7122.
Nabhani-Zeidan, Naja and Nasreddine (2011). 'Dietary Intake and Nutrition-Related Knowledge in a Sample of Lebanese Adolescents of Contrasting Socioeconomic Status', *Food and Nutrition Bulletin*, 32(2), pp. 75–83.
Naeeni, M.M., Jafari, S., & Omidi, R. (2019). 'Nutritional Knowledge, Practice, and Dietary Habits among school Children and Adolescents Abstract Methods : Results : Conclusions.' *International journal of preventive medicine*, 5(2), pp. 1–9.
Napier, C., & Oldewage-Theron, W. (2015). 'Dietary Intake and Nutritional Status of Adolescent Girls and Young Women in Durban, South Africa', *Journal of Consumer Sciences*, 43(0), pp. 1–15.
Narayan, B. (2013). 'Health, Hygiene and Nutrition: A cause of concern among adolescent girls in Kumaun Uttaranchal', *Asian Women*, 29(3), pp. 5–27.
Naude, C. (2013) 'Would an increase in vegetable and fruit intake help to reduce the burden of nutrition-related disease in South Africa? An umbrella review of the evidence', *South African Journal of Clinical Nutrition*, 26(3), pp. 104–114. doi: 10.1080/16070658.2013.11734454.
Nevenka, M.,Irena,J., & Marja, I. (2006). 'Eating Habits and Nutrition Status of School Children in Brodsko-Posavska County', *Croatian Journal of Public Health*, 7, pp. 1–4.
Ng, M., Fleming, T., Robinson., M., Thomson, B., Graetz, N., Margono, C., Mullany, E.C., Biryukov, S., Abbafati, C., Abera, S.F., Abraham, J.P., Abu-Rmeileh, N. M.E., Achoki, T., Albuhairan, F.S., Alemu, Z.A., Alfonso, R., Ali, M.K., Ali, R. Guzman, N.A., Ammar, W., Anwari, P., Banerjee, A., Barquera, S., Basu, S., Bennett, D.A., Bhutta, Z., Blore, J., Cabral, N., Nonato, I.C., Chang, J.C., Chowdhury, R., Courville, K.J., Criqui, M.H., Cundiff, D.K., Dabhadkar, K.C., Dandona, L., Davis, A., Dayama, A., Dharmaratne, S.D., Ding, E.L., Durrani, A.M., Esteghamati, A., Farzadfar, F., Fay, D.F.J., Feigin, V.L., Flaxman, A., Forouzanfar, M.H., Goto, A., Green, M.A., Gupta, R., Hafezi-Nejad, N., Hankey, G.J., Harewood, H.C., Havmoeller, R., Hay, S., Hernandez, L., Husseini, A., Idrisov, B.T., Ikeda, N., Islami, F., Jahangir, E., Jassal, S.K., Jee, S.H., Jeffreys,

M., Jonas, J.B., Kabagambe, E.K., Khalifa, S.E.A.H., Kengne, A.P., Khader, Y.S., Khang, Y. H., Kim, D., Kimokoti, R.W., Kinge, J.M., Kokubo, Y., Kosen, S. Kwan, G., Lai, T., Leinsalu, M., Li, Y., Liang, X., Liu, S., Logroscino, G., Lotufo, P. A., Lu, Y., Ma, J., Mainoo, N.K., Mensah, G.A., Merriman, T.R., Mokdad, A.H., Moschandreas, J., Naghavi, M., Naheed, A., Nand, D., Narayan, K.M.V., Nelson, E.L., Neuhouser, M.L., Nisar, M.I., Ohkubo, T., Oti, S.O., Pedroza, A., Prabhakaran, D., Roy, N., Sampson, U., Seo, H., Sepanlou, S.G., Shibuya, K., Shiri, R., Shiue, I., Singh, G.M., Singh, J.A., Skirbekk, V., Stapelberg, N.J.C., Sturua, L., Sykes, B.L., Tobias, M., Tran, B.X., Trasande, L., Toyoshima, H., Van De Vijver, S., & Vasankari, T.J. (2014). 'Global, Regional and National Prevalence of Overweight and Obesity in Children and Adults during 1980-2013: A systematic analysis for the Global Burden of Disease Study 2013', *The Lancet*, 384(9945), pp. 766–781. doi: 10.1016/S0140-6736(14)60460-8.

Nicklas, T.A. (2003). 'Calcium Intake Trends and Health Consequences from Childhood through Adulthood', *Journal of the American College of Nutrition*, 22(5), pp. 340–356. doi: 10.1080/07315724.2003.10719317.

Oldewage-Theron, W., Egal, A., & Moroka, T. (2015). 'Nutrition Knowledge and Dietary Intake of Adolescents in Cofimvaba, Eastern Cape, South Africa', *Ecology of Food and Nutrition*, 54(2), pp. 138–156. doi: 10.1080/03670244.2014.959944.

Oelofse, S., & Strydom, W. (2010). *A CSIR Perspective on Water in South Africa*. Pretoria. CSIR.

Packman, J., & Kirk, S.F.L. (2000). 'The Relationship between Nutritional Knowledge, Attitudes and Dietary Fat Consumption in Male Students', *Journal of Human Nutrition and Dietetics*, 13(6), pp. 389–395. doi: 10.1046/j.1365-277X.2000.002 60.x.

Panawalla, L. (2017). 'Difference between Simple and Complex Carbohydrates | Definition, Digestion, Absorption', *Pediaa*, 10, pp. 1–7.

Perveen, R. (2017). 'Assessing the Influence of Nutrition Education among Adolescent Girls (13-16 Years)', *Advances in Obesity, Weight Management & Control*, 6(4), pp. 144–147. doi: 10.15406/aowmc.2017.06.00167.

Petrie, H.J., Stover, E.A., & Horswill, C.A. (2004). 'Nutritional Concerns for the Child and Adolescent Competitor', *Nutrition*, 20(7–8), pp. 620–631. doi: 10.1016/j.nut.2004.04.002.

Pokrajac-Bulian, A., & Živčić-Bećirević, I. (2005). 'Locus of Control and Self-Esteem as Correlates of Body Dissatisfaction in Croatian University Students', *European Eating Disorders Review*, 13(1), pp. 54–60. doi: 10.1002/erv.606.

Popkin, B.M., Adair, L.S., & Ng, S.W. (2012). 'Global Nutrition Transition and the Pandemic of Obesity in Developing Countries', *Nutrition Reviews*, 70(1), pp. 3–21. doi: 10.1111/j.1753-4887.2011.00456.x.

Rani, M.A., & Sathiyasekaran, B.W.C. (2013). 'Behavioural Determinants for Obesity: A cross-sectional study among urban adolescents in India', Journal of Preventive Medicine and Public Health, 46(4), pp. 192–200. doi: 10.3961/jpmph.2013.46.4.192.

Ranjana, S., Mahomoodally, F.M., & Ramasawmy, D. (2013). 'Is Healthy Eating Behaviour Common among School Adolescents in Mauritius?', *Current Research in Nutrition and Food Science*, 1(1), pp. 11–22. doi: 10.12944/CRNFSJ.1.1.02.

Ranjit, N., Evans, M.H., Byrd-Williams, C., Evans, A.E., & Hoelscher, D.M. (2010). 'Dietary and activity correlates of sugar-sweetened beverage consumption

among adolescents', *Pediatrics*, 126(4), pp. 1–10. doi: 10.1542/peds.2010-1229.
Rasmussen, M., Krølner, R., Klepp, K.I., Lytle, L., Brug, J., Bere, E., & Due, P. (2006). 'Determinants of Fruit and Vegetable Consumption among Children and Adolescents: A review of the literature. Part I: Quantitative studies', *International Journal of Behavioral Nutrition and Physical Activity*, 3(22), pp.1–19. doi: 10.1186/1479-5868-3-22.
Reddy, S., James, S*.,* Sewpaul, R., Koopman, F., Funani, N.I., Sifunda, S., Josie, J., Masuka, P., Kambaran, N.S., & Omardien, R.G. (2008). *Umthenthe Uhlaba Usamila - The 2nd South African National Youth Risk Behaviour Survey*. Cape Town: South African Medical Research Council.
Rey-López, J.P., Vicente-Rodriguez, G*.,* Ortega, F.B*.*, Ruiz, J.R., Martinez-Gómez, D., De Henauw, S., Manios, Y., Molnar, D., Polito, A., Verloigne, M., Castillo, M. J., Sjöström, M., De Bourdeaudhuij, I., & Moreno, L.A. (2010). 'Sedentary Patterns and Media Availability in European Adolescents: The HELENA study', *Preventive Medicine*, 51(1), pp. 50–55. doi: 10.1016/j.ypmed.2010.03.013.
Ronquest, R., Lisa, C., Vink, N., & Sigge, G.O*.* (2015). 'Research Article Food Consumption Changes in South Africa since', *South African Journal of Science*, 111(9), pp. 1–12. doi: 10.17159/sajs.2015/20140354.
Roth, R.A. (2011). *Nutrition & Diet Therapy,* (10th ed). United States of America: Delmar.
Sadegholvad, S*.*, Yeatman, H., Parrish, A.M., & Worsley, A. (2017). 'Professionals' Recommended Strategies to Improve Australian Adolescents' Knowledge of Nutrition and Food Systems', *Nutrients*, 9(8), pp.1-12. doi: 10.3390/nu9080844.
Saifuddin, A. (2009). *Methods in Sample Surveys*.Dissertation. Johns Hopkins University. Available at: http://www.worldscientific.com/doi/pdf/10.1142/9789812
817419fmatter (Accessed: 16 June 2017).
Scaglioni, S., De-Cosmi, V*.*, Ciappolino, V., Parazzini, F., Brambilla, P., & Agostoni, C. (2018). 'Factors Influencing Children's Eating Behaviours', *Nutrients*, 10(6), pp. 1–17. doi: 10.3390/nu10060706.
Schmidt, R.L. (2010). *Impact of Nutrition Education on Dietary Habits of Female High School* Students. Dissertation. Eastern Michigan University. Available: http://commons.emich.edu/theses/369 (Accessed: 21 November 2019).
Schneider, Z, Elliott, D., LoBiondo-Wood, G.B.C., & H.J. (2004). *Nursing Research: Methods, critical appraisal and utilization* (2nd ed). Australia: Mosby-Elsevier.
Scully, M., Morley, B., Niven, P., Crawford, D., Pratt, I.S., & Wakefield, M*.* (2017). 'Factors Associated with High Consumption of Soft Drinks among Australian Secondary-School Students', *Public Health Nutrition*, 20(13), pp.2340–2348. doi: 10.1017/S1368980017000118.
Sedibe, M.H., Feeley, A.B., Voorend, C., Griffiths, P.L., Doak, C.M., & Norris, S.A. (2014). 'Narratives of Urban Female Adolescents in South Africa: Dietary and physical activity practices in an obesogenic environment', *South African Journal of Clinical Nutrition*, 27(3), pp. 114–119. doi: 10.1080/16070658.2014.11734499.
Sharma, S., Dortch, K.S., Byrd-Williams, C., Truxillio, J.B., Rahman, G.A., Bonsu, P., & Hoelscher, D*.* (2013). 'Nutrition-Related Knowledge, Attitudes, and Dietary Behaviors among Head Start Teachers in Texas: A Cross-Sectional Study', *Journal of the Academy of Nutrition and Dietetics* , 113(4), pp.558–562. doi: 10.1016/j.jand.2013.01.003.
Shim, J.S., Oh, K., & Kim, H.C. (2014). 'Epidemiology and Health Dietary Assessment Methods in Epidemiologic Studies', *Epidemiology and Health*, 36, pp.1–8. doi: 10.4178/epih/e2014009.

Shisana, O., Labadarios, D., Rehle, T., Simbayi, L., Zuma, K., Dhansay, A.R.P., Parker, W., Hoosain E, Naidoo, P., Hongoro, C., Mchiza, Z., Steyn, N.P., Dwane, N., Makoae, M.M.T., Ramlagan, S., Zungu, N., Evans, M.G., & Jacobs, L.F.M. (2013). *The South African National Health and Nutrition Examinationation Survey*. Cape Town. HSRC Press.

Sichert-Hellert, W., Beghin, L., De-Henauw, S., Grammatikaki, E., Hallström, L., Manios, Y., Mesana, M.I., Molnár, D., Dietrich, S., Piccinelli, R., Plada, M., Sjöström, M., Moreno, L.A., & Kersting, M. (2011). 'Nutritional Knowledge in European Adolescents: Results from the HELENA (Healthy Lifestyle in Europe by Nutrition in Adolescence) study', *Public Health Nutrition*, 14(12), pp.2083–2091. doi: 10.1017/S1368980011001352.

Silangwe, B.N. (2012). *Nutritional Status and Dietary Intake of Adolscent Girls in Mandlenkosi High School Lindelani*. Dissertation. Durban University of Technology. Available at: https://ir.dut.ac.za/handle/10321/875%0Ahttps://ir.dut.ac.za/bitstream/10321/875/1/Silangwe_2012_1.pdf (Accessed: 15 May 2018).

Simen-Kapeu, A. (2010). 'Should Public Health Interventions Aimed at Reducing Childhood Overweight and Obesity be Gender-Focused?', *BMC Public Health*, 10(June), pp. 1–8. doi: 10.1186/1471-2458-10-340.

Singh, U., Kochhar, A., & Singh, S. (2010). 'Complex Carbohydrates: Their effect in human health', *Proceedings of the Indian National Science Academy*, 76(2), pp. 81–87.

Singh, A.S., Mulder, C., Twisk, J. W.R., Van Mechelen, W., & Chinapaw, M.J.M. (2008). 'Tracking of Childhood Overweight into Adulthood: A systematic review of the literature', *Obesity Reviews*, 9(5), pp. 474–488. doi: 10.1111/j.1467-789X.2008.00475.x.

Sireesha, G., & Bindu, V. (2017). 'Teenage girls' knowledge attitude and practices on nutrition', *International Journal of Home Science*, 3(2), pp. 491–494. Available at: http://www.fags.org/nutrition/A-Ap/adolescent.

Skårdal, M., Western, I.M., Ask, A. M.S., & Øverby, N.C. (2014). 'Socioeconomic Differences in Selected Dietary Habits among Norwegian 13-14 Year-Olds: A cross-sectional study', *Food and Nutrition Research*, 58, pp. 1–8. doi: 10.3402/fnr.v58.23590.

Smuts, C.M., & Wolmarans, P. (2013). 'Food-Based Dietary Guidelines for South Africa: The new food-based dietary guideline for fat intake', *South African Journal of Clinical Nutrition*, 26(3), pp. 87–99.

Soliman, G.A. (2018) 'Dietary Cholesterol and the Lack of Evidence in Cardiovascular Disease', *Nutrients*, 10(6), pp.1-14. doi: 10.3390/nu10060780.

Statistics South Africa. (2018). *Demographic Profile of Adolescents in South Africa*. Pretoria: Statistics South Africa. Available at: http: www.statssa.gov.z (Accessed: 14 July 2019).

Statistics South Africa. (2016a). *Community Survey.* Pretoria: Statistics South Africa. Available at: https://wazimap.co.za/profiles/municipality-MP325-bushbuckridge/#citations%3E (Accessed: 15 October 2019).

Statistics South Africa. (2016b). *Mortality and Causes of Death in South Africa: Findings from death notification*. Pretoria: Statistics South Africa. Available at: http://www.governmentpublications.lib.uct.ac.za/news/mortality-and-causes-death-south-africa-findings-death-notification (Accessed: 15 October 2019).

Statistics South Africa. (2011). *Census in brief*. Pretoria: Statistics South Africa. Available at: http: www.statssa.gov.za (Accessed:13 June 2020).

Stephanie, E.(2013). *Slovin's Formula Sampling Techiniques*.(1st ed). New York: Houghton-Mifflin.

Steyn, N.P., Myburgh, N.G., & Nel, J.H. (2012). 'Evidence to Support a Food-Based Dietary Guideline on Sugar Consumption in South Africa', *Bulletin of the World Health Organization*. BMC Public Health, 81(8), pp. 599–608. doi: 10.1186/1471-2458-12-502.

Story, M., Kaphingst, K.M., Robinson-O'Brien, R., & Glanz, K. (2008). 'Creating Healthy Food and Eating Environments: Policy and Environmental Approaches', *Annual Review of Public Health*, 29(1), pp. 253–272. doi: 10.1146/annurev.publhealth.29.020907.090926.

Story, M., & Stang, J. (2005). *Understanding Adolescent Eating Behaviors* (2nd ed.). United States of America: Pelmar.

Story, M., & French, S. (2004). 'Food Advertising and Marketing Directed at Children and Adolescents in the US', *International Journal of Behavioral Nutrition and Physical Activity*, 1, pp. 1–17. doi: 10.1186/1479-5868-1-3.

Thielemann, B. (2012). *Assessment of Nutritional Knowledge and Eating Behaviors on the Weight and Obesity of College Students*. Dissertation. University of Arkansas, Fayetteville. Available at: http://scholarworks.uark.edu/ghesuht (Accessed: 20 November 2019).

Vaida, N. (2013). 'Prevalence of Fast Food Intake among Urban Adolescent Students', *The International Journal of Engineering and Science*, 2(1), pp. 353–359.

Varela-Moreiras, G., Ávila, J.M., Cuadrado, C., Del- Pozo, S. Ruiz, E., & Moreiras, O. (2010). *Evaluation of Food Consumption and Dietary Patterns in Spain by the Food Consumption Survey* ', *European Journal of Clinical Nutrition',* 64, pp.37-43. doi: 10.1038/ejcn.2010.208.

Vereecken, C.A., De Henauw, S., & Maes, L. (2005). 'Adolescents' Food Habits: Results of the Health Behaviour in School-aged Children survey', *British Journal of Nutrition*, 94(3), pp. 423–431. doi: 10.1079/bjn20051513.

Vorster, H., Badham, J., & Venter, C. (2013). 'Food-Based Dietary Guidelines for South Africa FBDG- SA (2013). Food-Based Dietary Guidelines for South Africa', *South African Journal of Clinical Nutrition*, 26(3), pp. S1–S164.

Vorster, E., & Bourne, L. (2008). 'The Nutrition Transition in South Africa', in Steyn, N.P., & Temple, N (Eds.) *Community nutrition textbook for South Africa, rights approach*. South Africa: MRC & FAO, pp. 30–32.

Wardle, J., Haase, A.M., Steptoe, A., Nillapun, M., Jonwutiwes, K., & Bellisle, F. (2004). 'Gender Differences in Food Choice: The contribution of health beliefs and dieting', *Annals of Behavioral Medicine*, 27(2), pp. 107–116. doi: 10.1207/s15324796abm27025.

Washi, S.A., & Ageib, M.B. (2010). 'Poor Diet Quality and Food Habits are Related to Impaired Nutritional Status in 13- to 18-Year-Old Adolescents in Jeddah', *Nutrition Research* ,30(8), pp. 527–534. doi: 10.1016/j.nutres.2010.07.002.

Webb, M.C., & Beckford, S.E. (2014). 'Nutritional Knowledge and Attitudes of Adolescent Swimmers in Trinidad and Tobago', *Journal of Nutrition and Metabolism*, pp.1- 7. doi: 10.1155/2014/506434.

Welman, C.K.F., & Mitchel, B. (2005). *Research Methodology,* (3rd ed). Oxford: Oxford University Press Southern Africa.

Wenhold, F., & Faber, M. (2008). *Nutritional Status of South Africans: Links to agriculture and water*, *Nutritional value and water use of indigenous crops for improved rural livelihoods*. South Africa: Water Research Commission. Available

at: http://www.orders@wrc.org (Accessed: 30 September 2019).
Whati, L.H. (2005). *The Development of a Valid and Reliable Nutrition Knowledge Questionnaire and Performance-Rating Scale for Urban South-African Adolescents Participating in the 'Birth-to-twenty' study*. Dissertation. University of Stellenbosch.
WHO (2005). *Nutrients in Drinking Water Protection of the Human Environment Water, Sanitation and Health*. Geneva: WHO. Available at: http://www.who.int/water_sanitation_health/dwq/nutrients (Accessed: 15 November 2019).
WHO & FAO (2003). *Diet, Nutrition and the Prevention of Chronic Diseases*. Geneva: WHO and FAO.
Yadav, V.P. (2017). 'Understanding the Body Image of Adolescents : A psychological perspective', *Journal of Nutrition and Metabolism,* 3(6), pp. 588–594.
Yoon, J., Lyu, E., & Lee, K. (2008). 'Korean Adolescents' Perceptions of Nutrition and Health Towards Fast Foods in Busan Area', *Nutrition Research and Practice*, 2(3), pp. 171. doi: 10.4162/nrp.

APPENDIXES

Appendix 1: Informed Consent Form

Title of the Study: Assessment of Nutrition Knowledge and Dietary Practice of Adolescent Learners Aged 13-18 Years Old at Polokwane Municipality, Limpopo Province, South Africa.

Researcher: Maponya TD
University of South Africa

I, **Thabo Daniel Maponya** (Researcher) hereby request your permission to allow your child to participate in my study. I am currently registered for Master of Consumer Science at the University of South Africa (UNISA). Please read the following information about the study and if you would like your child to participate, please sign at the end of the form below.

Purpose of the research: To assess nutrition knowledge and dietary practices and of adolescent learners aged 13-18 years in Polokwane Municipality, Capricorn District, Limpopo Province, South Africa

What you will be asked to do in the research: They will be asked to answer questions related to socio-demographic information, nutrition knowledge, and dietary practices.

The time required for participation: The study will take 25 to 30 minutes.

Risks and discomforts: There will be no risks or discomforts for participating in this study.

Benefits of the research and benefits to you: The research findings may help the Department of Health and Department of Education to know the status of nutrition knowledge and practices leading to improvement of nutrition services. The research may also add to the body of nutrition knowledge and dietary practices of adolescent learners and it will also assist in further researches.

Voluntary Participation: Participation in this study is completely voluntary. If they decide not to participate, there will not be any negative consequences.

Withdrawal from the study: They may stop participating in the study at any time, for any reason, if they so decide. Their decision to stop participating, or to refuse to answer particular questions, will not affect your relationship with the researchers or any other group associated with this project. In the event that they withdraw from the study, all associated data collected will be destroyed immediately.

Confidentiality: The name of the child will not be recorded anywhere and no one will be able to connect them to the answers they give. Their name will be given a code number which they will be referred to in the data, any publications, or other research reporting methods such as conference proceedings.

Questions about the study: If you have any questions about this study, feel free to email the researcher at tdanielmaponya@gmail.com or the Supervisor at malonf@unisa.ac.za.

By signing this form, I am attesting that I have read and understood the information above and I freely give my permission for my child to participate.

Parental/Legal guardian full name: _____

Parental/Legal guardian signature: _____ **Date:** _____

Researcher signature: _____**Date:** _____

Appendix 2: Marking Guide

The answers are marked with an x

NUTRITION KNOWLEDGE QUESTIONNAIRE

19. Cooked meat/ fish/ chicken sold on the street may not always be safe to eat because

It may have been undercooked	1	
The cook may not have used fresh meat	2	
It may have been kept for a long time before being cooked	3	
All of the above	4	X

20. Why should you not have starches at most meals?

They cause diseases	1	
Even eating small amounts can cause weight gain	2	
They are not important for your health	3	
None of the above	4	X

21. How much water should you drink a day?

You don't have to drink water everyday	1	
1 to 3 glasses	2	
4 to 6 glasses	3	
7 to 9 glasses	4	X

22. What is a portion of cooked vegetables?

1 Tablespoon	1	
Half a cup	2	X
1 cup	3	
2 cups	4	

23. How many fruits and vegetables should you eat every day?

1 fruit and vegetable a day	1	
3-4 fruit and vegetables a day	2	
5 or more fruits and vegetable everyday	3	X
There is no need to eat fruits and vegetables daily.	4	

24. Which of the following is a low fat snack?

"Simba" Chips	1	
Popcorn	2	X
Fried chips	3	
"Niknaks"	4	

25. From which group of foods should you eat the most every day?

Apples, bananas, spinach, carrots	1	
Bread, samp, rice, porridge	2	X
Milk, yogurt, cheese	3	
Chicken, fish, beans, eggs	4	

26. Your body only needs a little bit of salt to be healthy

True	1	X
False	2	

27. It is healthy to snack on foods that contain a lot of sugar?

True	1	
False	2	X

28. What constitutes a well-balanced diet?

Consists mostly of meat, with smaller amounts of starch, fruits, vegetables, and dairy products	1	
Consists mostly of starches, vegetables, and fruits, with smaller amounts of meat and dairy products	2	X
Consists mostly of vegetables, and smaller amounts of meat and dairy products	3	
None of the above	4	

29. Eating a lot of different kinds of foods is healthier than eating only a few kinds foods

True	1	X
False	2	

30. It is impossible to get all the vitamins and minerals you need from food-therefore you need to take a vitamin and/ mineral pill as supplement.

True	1	
False	2	X

31. Which one of the following groups of nutrients are found in large amounts in fruits and vegetables?

Fibre, Vitamin A	1	X
Starches, fat, Vitamin D	2	
Fats, Iron, Calcium	3	
None of the above	4	

32. Which of the following breakfast menus contain little fat?

Whole-wheat toast with thinly spread margarine	1	
Weet-Bix with 2% fat milk	2	
Bacon and egg	3	
1 and 2	4	X

33. The reason why beans, peas, and lentils are good for you is that:

They contain only small amounts of fat	1	
They contain a lot of fibre	2	
They can protect you from some diseases	3	
All of the above	4	X

34. Dry beans, peas, and lentils should be eaten often.

True	1	X
False	2	

35. The key to a healthy way of eating is to:

Eat many different kinds of foods	1	
Eat some foods more than other foods	2	
Eat certain kinds of foods in moderate or small amounts	3	
All of the above	4	X

36. Which food has the most fibre?

White rolls	1	
Brown bread	2	
White bread	3	
Whole wheat bread	4	X

37. Which foods contain a lot of calcium?

Chicken and eggs	1	
Milk and yoghurt	2	X
Pilchards	3	
1 and 3	4	

38. Sugar and foods that contain sugar should be eaten in small amounts.

True	1	X
False	2	

39. Dry beans, peas, and lentils are a healthy choice to eat in place of meat.

True	1	X
False	2	

40. You can eat as much meat as you want every day.

True	1	
False	2	X

Appendix 3: 24-Hour Recall

Time	What did you eat yesterday?
Breakfast (period up to 09h00)	
In-between snack (between 09h00 and 12h00)	
Lunch (12h00 to 14h00)	
In-between snack (14h00 to 18h00)	
Dinner (18h00 to 20h00)	
After dinner (after 20h00)	

Appendix 4: Questionnaire

Title of the Study: Assessment of Nutrition Knowledge and Dietary Practice of Adolescent Learners Aged 13-18 Years in Polokwane Municipality, Limpopo Province, South Africa

Researcher: Maponya TD
University of South Africa

Instructions:
I would like to thank you for agreeing to participate in this study. The information that you will provide will remain confidential. There will be no adverse consequences to you from your participation in this study. There is no right or wrong answer. The researcher will ask you questions and feel free to respond and ask questions where you do not understand.

Date of interview: yyyy _____ mm _____ dd _____

Name of Secondary High School:
_____

SECTION A: SOCIO-DEMOGRAPHIC INFORMATION
LEARNER

SCHOOL CODE	LEARNER CODE

Interviewer Code: ----------

1. Gender

Male	1	
Female	2	

2. Date of birth
YYYY----------MM----------DD----------

3. Educational level

Grade 8	1	
Grade 9	2	
Grade 10	3	
Grade 11	4	

4. Place of residence

Town/City	1	
Township	2	
Rural	3	
Other, Specify----------	4	

5. Who do you stay with at home?

Mother	1	
Father	2	
Both parents	3	
Legal guardian	4	
Alone	5	
Other,Specify----------	6	

6. Parents marital status

Married/Living together	1	
Single	2	
Divorced/widow	3	

7. Mother educational background

Never attended	1	
Grade 1-4	2	
Grade 5-7	3	
Grade 8-10	4	
Grade 11-12	5	
Tertiary, specify.....	6	

8. Father educational background

Never attended	1	
Grade 1-4	2	
Grade 5-7	3	
Grade 8-10	4	
Grade 11-12	5	
Tertiary, specify.....	6	

9.Mother employment status

Employed	1	
Unemployed	2	
If employed, what type of employment? ----------	3	

10.Father employment status

Employed	1	
Unemployed	2	
If employed, what type of employment? ----------	3	

11.Legal guardian employment status

Employed	1	
Unemployed	2	
If employed, what type of employment?	3	

----------		

12. Do you have access to water?

Yes	1	
No	2	

13. If yes, what is the source of water?

Borehole	1	
Tap	2	
Dam/River	3	
Other, specify----------	4	

14. Do you have a vegetable garden at home?

Yes	1	
No	2	

15. What type of fuel do you use for cooking?

Electricity	1	
Gas	2	
Paraffin	3	
Firewood	4	
Other, specify----------	5	

16. Who is mainly responsible for food preparation at home?

Mother	1	
Father	2	
Sister	3	
Brother	4	
You	5	
Other, Specify----------	6	

17. Have you ever been taught about nutrition?

Taught	1	
Not Taught	2	

18. If yes, source of nutrition information

Radio	1	
Television	2	
Magazine	3	
Teacher	4	
Other, specify----------	5	

SECTION B: NUTRITION KNOWLEDGE QUESTIONNAIRE

19. Cooked meat/ fish/ chicken sold on the street may not always be safe to eat because

It may have been undercooked	1	
The cook may not have used fresh meat	2	
It may have been kept for a long time before being cooked	3	
All of the above	4	

20. Why should you not have starches at most meals?

They cause diseases	1	
Even eating small amounts can cause weight gain	2	
They are not important for your health	3	
None of the above	4	

21. How much water should you drink a day?

You don't have to drink water everyday	1	
1 to 3 glasses	2	
4 to 6 glasses	3	
7 to 9 glasses	4	

22. What is a portion of cooked vegetables?

1 Tablespoon	1	
Half a cup	2	
1 cup	3	
2 cups	4	

23. How many fruits and vegetables should you eat every day?

1 fruit and vegetable a day	1	
3-4 fruit and vegetables a day	2	
5 or more fruits and vegetable everyday	3	
There is no need to eat fruits and vegetables daily.	4	

24. Which of the following is a low fat snack?

"Simba" Chips	1	
Popcorn	2	
Fried chips	3	
"Niknaks"	4	

25.From which group of foods should you eat the most every day?

Apples, bananas, spinach, carrots	1	
Bread, samp, rice, porridge	2	
Milk, yogurt, cheese	3	
Chicken, fish, beans, eggs	4	

26. Your body only needs a little bit of salt to be healthy

True	1	
False	2	

27. It is healthy to snack on foods that contain a lot of sugar.

True	1	
False	2	

28. What constitutes a well-balanced diet?

Consists mostly of meat, with smaller amounts of starch, fruits, vegetables, and dairy products	1	
Consists mostly of starches, vegetables, and fruits, with smaller amounts of meat and dairy products	2	
Consists mostly of vegetables, and smaller amounts of meat and dairy products	3	
None of the above	4	

29. Eating a lot of different kinds of foods is healthier than eating only a few kinds foods

True	1	
False	2	

30. It is impossible to get all the vitamins and minerals you need from food- you need to take a vitamin and/or mineral pill as a supplement

True	1	
False	2	

31. Which one of the following groups of nutrients are found in large amounts in fruits and vegetables?

Fibre, Vitamin A	1	
Starches, fat, Vitamin D	2	
Fats, Iron, Calcium	3	
None of the above	4	

32. Which of the following breakfast menus contain little fat?

Whole-wheat toast with thinly spread margarine	1	
Weet-Bix with 2% fat milk	2	
Bacon and egg	3	
1 and 2	4	

33. The reason why beans, peas, and lentils are good for you is that:

They contain only small amounts of fat	1	
They contain a lot of fibre	2	
They can protect you from some diseases	3	
All of the above	4	

34. Dry beans, peas, and lentils should be eaten often.

True	1	
False	2	

35. The key to a healthy way of eating is to:

Eat many different kinds of foods	1	
Eat some foods more than other foods	2	
Eat certain kinds of foods in moderate or small amounts	3	
All of the above	4	

36. Which food has the most fibre?

White rolls	1	
Brown bread	2	
White bread	3	
Whole wheat bread	4	

37. Which foods contain a lot of calcium?

Chicken and eggs	1	
Milk and yoghurt	2	
Pilchards	3	
2 and 3	4	

38. Sugar and foods that contain sugar should be eaten in small amounts.

True	1	
False	2	

39. Dry beans, peas, and lentils are a healthy choice to eat in place of meat.

True	1	
False	2	

40. You can eat as much meat as you want every day.

True	1	
False	2	

SECTION C: DIETARY PRACTICES

41. Do you eat breakfast before going to school?

Yes	1	
No	2	

42. If no, what is the reason?

Breakfast not prepared at home	1	
Fear of being late for school	2	
Parents give me money to buy food on the way to school	3	
I prefer to buy food out from home as my breakfast	4	
Other, specify----------	5	

43. How many times have you skipped breakfast in the past week?

Not skipped	1	
1-2 times per week	2	
3-4 times per week	3	
5-6 times per week	4	
7 times per week	5	

44. How many times have you skipped lunch in the past week?

Not skipped	1	
1-2 times per week	2	
3-4 times per week	3	
5-6 times per week	4	
7 times per week	5	

45. How many times have you skipped supper in the past week?

Not skipped	1	
1-2 times per week	2	
3-4 times per week	3	
5-6 times per week	4	
7 times per week	5	

46. How many cooked meals do you usually consume per day?

1 meal	1	
2 meals	2	
3 meals	3	
4 meals	4	
More than 4 meals	5	

47. Do you usually bring food from home to school?

Yes	1	
No	2	

48. If yes, what type of food do you bring from home to school?

Canned or packaged fruits juice	1	
Biscuits, cakes, and bread	2	
Boiled rice	3	
Others, specify----------	4	

49. Do you usually buy snacks during lunch breaks at school?

Yes	1	
No	2	

50. If yes, what do you usually buy during lunch breaks at school?

Ice cream	1	
Sweets	2	
Simbas	3	
Fruits	4	
Others, specify----------	5	

SECTION D: FOOD FREQUENCY QUESTIONNAIRE

Instructions:
Please tick how often you ate or drank each of these items in the past week.

		PER WEEK						
FOOD ITEMS	**NEVER**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Apples								
Banana								
Orange								
Pear								
Other fruits								
Fruit juice								
Artificial juice, e.g., Oros								
Cold drink, e.g., Coke								
Spinach								
Carrots								
Cabbage								
Morogo								
Beetroot								
Pumpkin								
Other Vegetables								
Porridge								
Rice								
Samp								
Potato								
Mealierice								
Bread								
Spaghetti Macaroni								
Milk								
Yoghurt								
Cheese								
Beef								
Mutton								
Chicken								
Goat								
Fish								
Eggs								
Chicken necks, runaway, livers.								
Oats meal/ Mabella								
Rice crispies/ Cornflakes								
Vetkoek								

Biscuits								
Pies								
Cake								
Margarine								
Jam								
Peanut Butter								
Sweets								
Zimba								
Niknaks								
Ice-cream								
Beans								
Peas								
Lentils								
Peanuts								
Coffee/ Tea								
Cremora								
Sugar								
Achaar								
Potato chips								
Russian								
Vienna								
Polony								

Appendix 5: Ethical Approval Letter from University of South Africa

UNISA university of south africa

CAES GENERAL RESEARCH ETHICS REVIEW COMMITTEE

National Health Research Ethics Council Registration no: REC-170616-051

Date: 29/03/2017

Ref #: **2017/CAES/066**
Name of applicant: **Mr TD Maponya**
Student #: **58017828**

Dear Mr Maponya,

Decision: Ethics Approval

Proposal: Assessment of nutrition knowledge, dietary practices of adolescent learners aged 13-18 years old in Polokwane municipality, Limpopo Province, South Africa

Supervisor: Ms F Malongane

Qualification: Postgraduate degree

Thank you for the application for research ethics clearance by the CAES Research Ethics Review Committee for the above mentioned research. Approval is granted for the project, *subject to submission of the relevant permission letters.*

Please note that the approval is valid for a one year period only. After one year the researcher is required to submit a progress report, upon which the ethics clearance may be renewed for another year.

Due date for progress report: 31 March 2018

Please note the points below for further action:

1. The permission letters from the schools are outstanding and must be submitted to the Committee before data gathering at any particular school may commence.

The application was reviewed in compliance with the Unisa Policy on Research Ethics by the CAES Research Ethics Review Committee on 16 March 2017.

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

Appendix 6: Approval Letter from the Limpopo Department of Education

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

Ref: 2/2/2 Enq: MC Makola PhD Tel No: 015 290 9440 E-mail:MakolaMC@edu.limpopo.gov.za

Maponya TD
P O Box 2615
Sovenga
0727

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH

1. The above bears reference.

The Department wishes to inform you that your request to conduct research has been approved. Topic of the research proposal; **"ASSESSMENT OF NUTRITION KNOWLEDGE, DIETARY PRACTICES AND ANTHROPOMETRIC MEASUREMENTS OF ADOLESCENT LEARNERS AGED 13-18 YEARS OLD IN POLOKWANE MUNICIPALITY, LIMPOPO PROVINCE SOUTH AFRICA."**.

2. The following conditions should be considered:

3.1 The research should not have any financial implications for Limpopo Department of Education.

3.2 Arrangements should be made with the Circuit Office and the schools concerned.

3.3 The conduct of research should not anyhow disrupt the academic programs at the schools.

3.4 The research should not be conducted during the time of Examinations especially the fourth term.

3.5 During the study, applicable research ethics should be adhered to; in particular the principle of voluntary participation (the people involved should be respected).

REQUEST FOR PERMISSION TO CONDUCT RESEARCH:MAPONYA TD

CONFIDENTIAL

Cnr. 113 Biccard & 24 Excelsior Street, POLOKWANE, 0700, Private Bag X9489, POLOKWANE, 0700
Tel: 015 290 7600, Fax: 015 297 6920/4220/4494

The heartland of southern Africa - development is about people!

Appendix 7: Approval Letter from the Department of Education (Capricorn District)

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

Private Bag X 9771
POLOKWANE
0700
Tel: 015 285 7300
Fax: 015 285 7499

DEPARTMENT OF
EDUCATION
CAPRICORN POLOKWANE DISTRICT

CONFIDENTIAL

Ref : 2/2/2
Enq :Mphaphuli AJ
Tel No.:015 285 7410
Email :MphaphuliAJ@edu.limpopo.gov.za
Date: 26 June 2017

To : Maponya TD
University of Limpopo
P. O. BOX 2615
SOVENGA
0727

SUBJECT: REQUEST TO CONDUCT RESEARCH IN PIETERSBURG CIRCUIT AND KGAKOTLOU CIRCUIT : POLOKWANE DISTRICT.

TITLE: "ASSESSMENT OF NUTRITION KNOWLEDGE, DIETARY PRACTICES AND ANTHROPOMETRIC MEASUREMENTS OF ADOLESCENT LEARNERS AGE 13 -18 YEARS OLD I N POLOKWANE MUNICIPALITY. LIMPOPO PROVINCE, SOUTH AFRICA ".

1. The above matter refers.
2. The Department wishes to inform you that your request to conduct a research has been approved.
3. The following conditions should be considered :

3.1 The research should not have any financial implication for Limpopo Department of Education.

Appendix 8: Approval Letters from Education Circuits

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

PIETERSBURG CIRCUIT

ENQ : Tladi NP
TEL No : 015 290 9484
Email : TladiNP@edu.limpopo.gov.za
DATE : **17 October 2017**

Mr Maponya TD
P.O. BOX 2615
SOVENGA
0727

Dear Sir

SUBJECT: PERMISSION TO CONDUCT RESEARCH: MAPONYA TD

Research topic: "Assessment of nutrition knowledge and dietary practices and anthropometric of adolescent learners aged 13-18 years old in Polokwane Municipality, Limpopo Province, South Africa"

1. The above matter bears reference.
2. This office grants you permission to conduct your research in the schools in Pietersburg Circuit.
3. Kindly adhere to all the conditions given by the District Director, as you have been granted permission to conduct your research in Pietersburg Circuit in Florapark Comprehensive High School.
4. You are also expected to call and confirm with the school the dates of your visit.
5. We wish you a successful and happy stay in Florapark Comprehensive High School during your period of research.

Ratale SM: Circuit Manager

"We Belong, We Care, We Serve"

LIMPOPO
PROVINCIAL GOVERNMENT

DEPARTMENT OF
EDUCATION

POLOKWANE DISTRICT
KGAKOTLOU CIRCUIT

ENQ: RAMMALA MF
CELL: 072 209 5834
Email: kgakotloucircuitoffice@gmail.com

DATE: 01/06/2017

TO: THE PRINCIPAL
MAPELOANA SECONDARY SCHOOL
RAMATHOPE SECONDARY SCHOOL

RE: REQUEST TO CONDUCT RESEARCH AT YOUR SCHOOL:
MAPONYA T.D

1. The above matter refers.
2. Kindly allow Mr. Maponya TD to conduct research at your school. The research must be conducted in the afternoon so that teaching and learning should not be compromised.
3. Attached please find the application letter and approval from Head Office.
4. Thanking you in advance.

.....
CIRCUIT MANAGER
KGAKOTLOU CIRCUIT

2017 -06- 01

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

PRIVATE BAG X1108
SOVENGA
0727
TEL 015 267 5641
FAX 015 267 5248

DEPARTMENT OF EDUCATION
CAPRICORN DISTRICT
MANKWENG CIRCUIT

Enq: Kekana MJ
Tel No: 015 2675641

2017.06.05

MAPONYA T.D
P O BOX 2615
Sovenga
0727

PERMISSION TO CONDUCT RESEARCH BASED ON " ASSESSMENT OF NUTRITION KNOWLEDGE,DIETARY PRACTICES AND ANTHROPOMETRIC MEASUREMENTS OF ADOLESCENT LEARNERS AGED 13-18 YEARS OLD IN POLOKWANE MUNICIPALITY,LIMPOPO PROVINCE SOUTH AFRICA."AT DITLALEMESO SECONDARY SCHOOL

1. The above matter refers.
2. We acknowledged the receipt of your letter dated 01.06.2017 requesting to conduct Research on "Assessment of nutrition knowledge, dietary practices and anthropometric measurements of adolescent learners aged 13-18 years old in Polokwane Municipality ,Limpopo Province South Africa." At Ditlalemeso secondary school.
3. The above mentioned research is accepted and permission is granted.
4. Wishing you for the success in your studies.

.....
MAGAGANE M.D.
(CIRCUIT MANAGER)

01/06/17
.....
DATE

P O Box 2615
Sovenga
0727

The Circuit Manager
Department of Education
Lebopo circuit
0700

Dear Sir /Madam

LETTER TO ASK FOR PERMISSION

TITLE: *Assessment of nutrition knowledge and dietary practices of adolescent learners aged 13-18 years old in Polokwane Municipality, Limpopo Province, South Africa.*

I hereby wish to ask for permission to conduct a research on the above-mentioned title. I have selected to use learners from Phunyako and Mamodikeleng secondary schools. I am a Masters student of the Department of Life and Consumer Sciences at the University of South Africa.

This research study is expected to take approximately three months. The Data collection procedures will include nutrition knowledge and dietary practices .The participants will be from 13 to 18 years old. . Grade 12 learners will not be included in the study due to high academic workload.

The parents will be given consent form before the study.

Your consideration in this regard will be appreciated.

The Department of education, Provincial has already given permission (See the attached letter)

Yours Faithfully

Maponya.....

Student (Maponya TD)

Email:tdanielmaponya@gmail.com

Cell: 0785718669

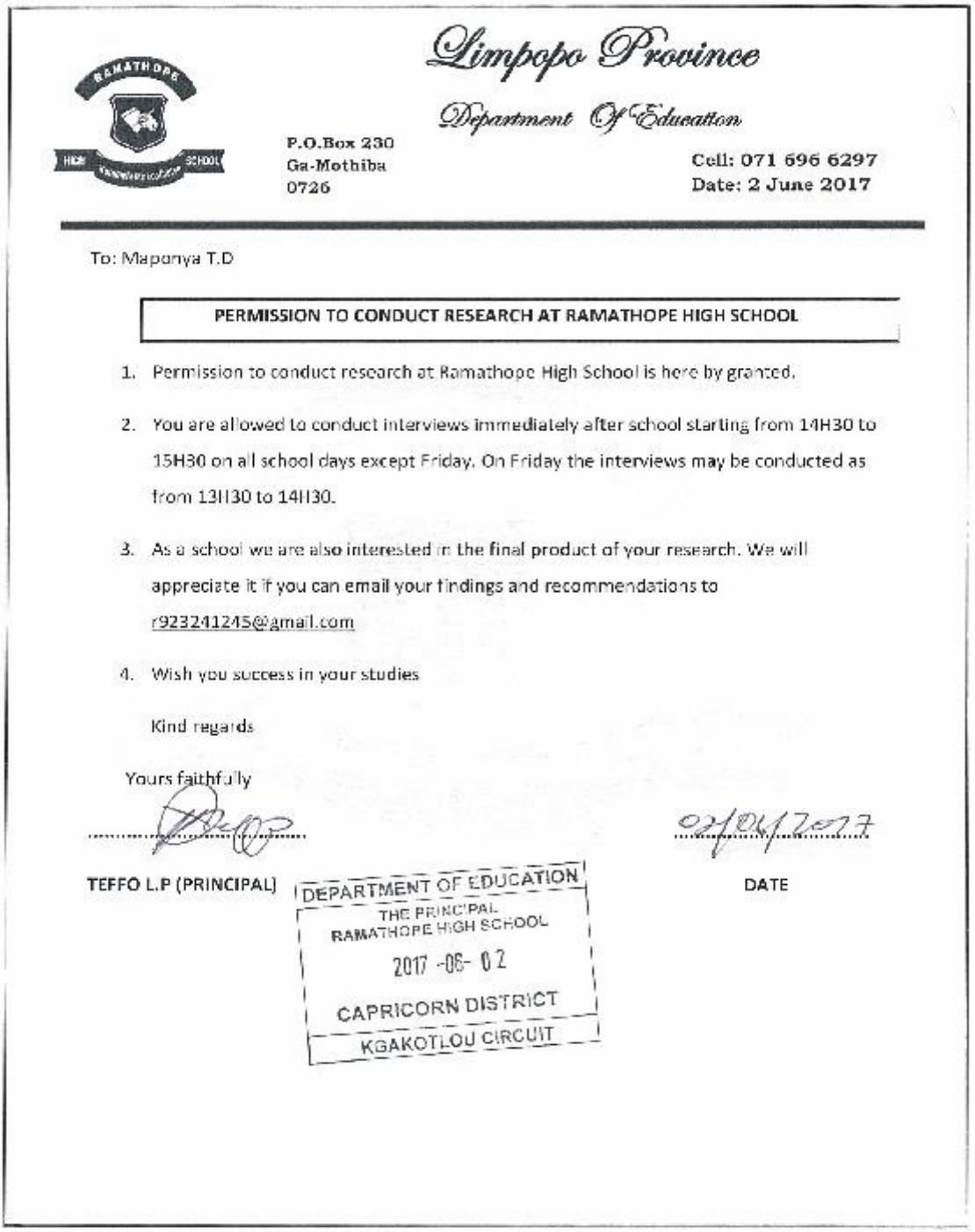
LIMPOPO PROVINCE
ARTMENT OF EDUCATION
BOWAKGOMO DISTRICT OFFICE
LEBOPO CIRCUIT OFFICE
2017 -06- 01
PRIVATE BAG X1108
SOVENGA, 0727
O YA THUTO LIMPOPO PROVINCE
20170601
Date

To all affected schools in the Lebopo Circuit.

Kindly note the contents of this communique and Re attach. Ensure that the author is kindly assisted.

Circuit Manager

Appendix 9: Approval Letters from Schools



Limpopo Province

Department Of Education

P.O.Box 230
Ga-Mothiba
0726

Cell: 071 696 6297
Date: 2 June 2017

To: Maponya T.D

PERMISSION TO CONDUCT RESEARCH AT RAMATHOPE HIGH SCHOOL

1. Permission to conduct research at Ramathope High School is here by granted.
2. You are allowed to conduct interviews immediately after school starting from 14H30 to 15H30 on all school days except Friday. On Friday the interviews may be conducted as from 13H30 to 14H30.
3. As a school we are also interested in the final product of your research. We will appreciate it if you can email your findings and recommendations to r923241245@gmail.com
4. Wish you success in your studies

Kind regards

Yours faithfully

.....

TEFFO L.P (PRINCIPAL)

02/06/2017

DATE

DEPARTMENT OF EDUCATION
THE PRINCIPAL
RAMATHOPE HIGH SCHOOL
2017 -06- 02
CAPRICORN DISTRICT
KGAKOTLOU CIRCUIT

DITLALEMESO SECONDARYSCHOOL
P.O. BOX 1353
SOVENGA
0727

2017/06/05

Enq. MOTHIBA R.M
Tel: 079 158 2267
Email: www.ditlalemesosecondary@gmail.com

To whom it may concern

Student Maponya TD's request to conduct research at the school is accepted.

The student will however only come in the second semester since examinations have already began.

Regards

R.M MOTHIBA

EMIS: 923240563

ENQ: TSEBE LN

CONTACT: 083 208 4894

Mamodikeleng Secondary School

P O BOX 265

THOLONGWE

0734

07 June 2017

Sir

PERMISSION TO CONDUCT RESEARCH AT OUR SCHOOL : MAPONYA TD

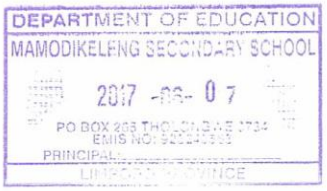
We would like to inform you that you are granted the permission to conduct research at our school for your studies.

I wish your good luck in your research.

Yours Faithfully

Tsebe

Principal



PHUNYAKO SECONDARY SCHOOL

ENQ : MAHLAKO P.M **EMIS NO : 923241160**

CELL : 072 088 7153 **CENTRE : 7233135**

MAPONYA T.D

P.O.BOX 2615

SOVENGA

0727

RE : REQUEST FOR PERMISSION (RESEARCH)

This is to inform you that your request to conduct a research for your studies at the above mentioned institution targeting learners in Grade 8 – 11 is accepted.

The enrolment of learners in the targeted grades is as follows:

Grade : 8 – (111)

Grade : 9 – (74)

Grade : 10 –(101)

Grade : 11 – (79)

The school is from now on waiting for you and hoping you will stick to the regulations of the Department as stated and wishing you all the best in your studies.

Hoping you will find this in order.

MAHLAKO P.M

(PRINCIPAL)

DEPARTMENT OF EDUCATION
PHUNYAKO SECONDARY SCHOOL
THE PRINCIPAL
2017 -06- 08
Stand No. 188, Dihlopaneng Village
Polokwane, 0914
LIMPOPO PROVINCE

MAPELOANA SECONDARY SCHOOL

CAPRICORN DISTRICT

EMIS NO: 0923240686
ENQ: Mr. Letsoalo T.J.
☎ : 072 948 8434
chioneletsoalo@gmail.com

KGAKOTLOU CIRCUIT

P.O. ✉ 68
Nobody – Ga Mothiba
0726

2 June 2017

To: Maponya T.D

PERMISSION TO CONDUCT RESEARCH AT MAPELOANA SEC SCHOOL

1. Permission to conduct research at Mapeloana Secondary School is hereby granted.
2. You are allowed to conduct interviews immediately after school starting from 14H30 to 15H30 on all school days except Wednesday. On Wednesday the interviews may be conducted as from 13H30 to 14H30.
3. As a school we are also interested in the final product of your research. We will appreciate it if you can email your findings and recommendations to chioneletsoalo@gmail.com .
4. Wish you success in your studies

Kind regards

Yours faithfully
Letsoalo T.J (

DEPARTMENT OF EDUCATION
MAPELOANA SECONDARY SCHOOL
079 208 3731
2017 -06- 02
mapeloanasecondaryschool@gmail.com
NOBODY, GA-MOTHAPO : THAKGALANG
LIMPOPO PROVINCE

DEPARTMENT OF EDUCATION - LIMPOPO PROVINCE

TAXILA SECONDARY SCHOOL

347 ORIENT DRIVE – NIRVANA – POLOKWANE
P.O. BOX 377 – POLOKWANE – 0700
TELFAX: [015] 292 1475/6
E-mail address: taxilacombined@yahoo.com

DATE: _____ YOUR REF: _____ OUR REF: _____

ACCEPTANCE FOR RESEARCH

The school has permitted THABO MAPONYA to conduct research for his masters degree in consumer science.

Hoping that you will find this in order.

Deputy Principal Date 23/10/2017

DEPARTMENT OF EDUCATION
TAXILA SECONDARY SCHOOL
P.O. BOX 377
POLOKWANE
TEL & FAX (015) 292 1475/6
EMIS NO: 9[illegible]
E-mail:taxilacombined@yahoo.com
LIMPOPO PROVINCE
P.S.S.

Appendix 10: Information sheet

Title of the Study: Assessment of Nutrition Knowledge and Dietary Practice of Adolescent Learners Aged 13-18 Years Old at Polokwane Municipality, Limpopo Province, South Africa.

Researcher: Maponya TD
University of South Africa

Greeting: Thank you for allowing me to ask you questions.

Purpose of the research: To assess nutrition knowledge and dietary practices and of adolescent learners aged 13-18 years in Polokwane Municipality, Capricorn District, Limpopo Province, South Africa

What you will be asked to do in the research: They will be asked to answer questions related to socio-demographic information, nutrition knowledge, and dietary practices.

The time required for participation: The study will take 25 to 30 minutes.

Risks and discomforts: There will be no risks or discomforts for participating in this study.

Benefits of the research and benefits to you: The research findings may help the Department of Health and Department of Education to know the status of nutrition knowledge and practices leading to improvement of nutrition services. The research may also add to the body of nutrition knowledge and dietary practices of adolescent learners and it will also assist in further researches.

Voluntary Participation: Participation in this study is completely voluntary. If they decide not to participate, there will not be any negative consequences.

Withdrawal from the study: They may stop participating in the study at any time, for any reason, if they so decide. Their decision to stop participating, or to refuse to answer particular questions, will not affect your relationship with the researchers or any other group associated with this project. In the event that they withdraw from the study, all associated data collected will be destroyed immediately.

Confidentiality: The name of the child will not be recorded anywhere and no one will be able to connect them to the answers they give. Their name will be given a code number which they will be referred to in the data, any publications, or other research reporting methods such as conference proceedings.

Questions about the study: If you have any questions about this study, feel free to email the researcher at tdanielmaponya@gmail.com or the Supervisor at malonf@unisa.ac.za.